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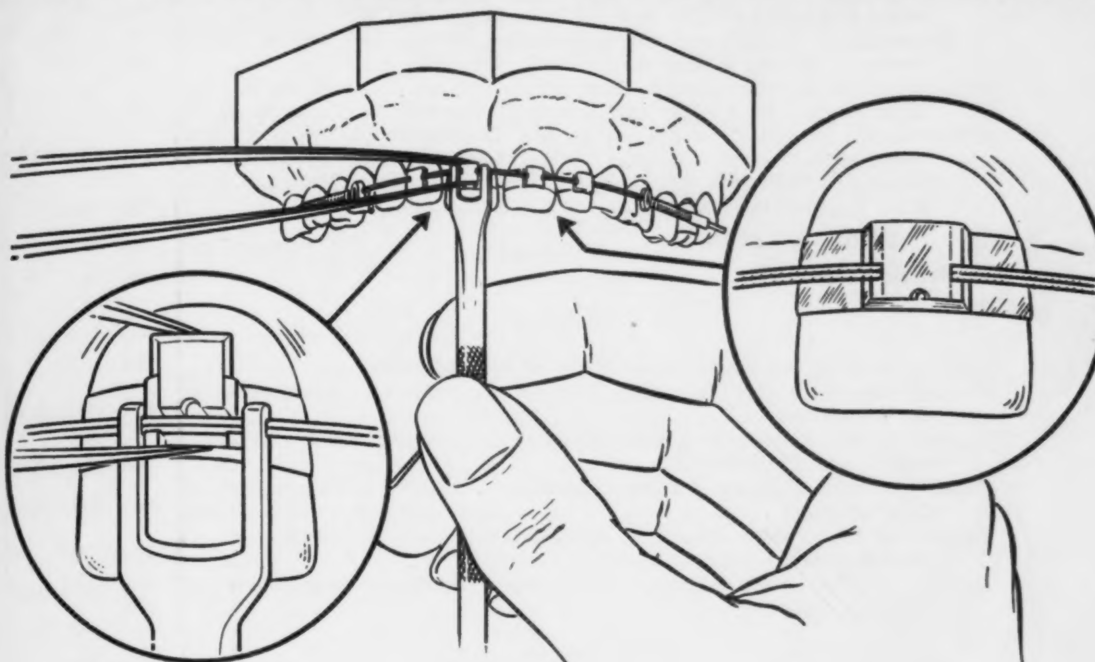

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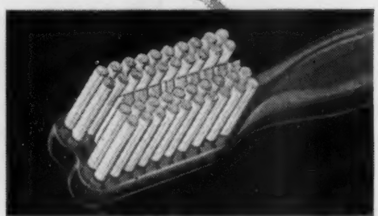

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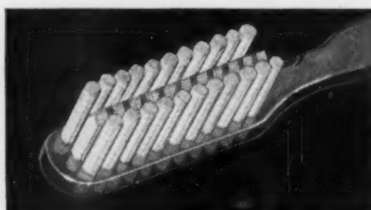

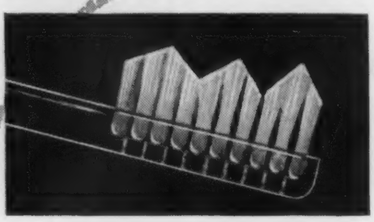

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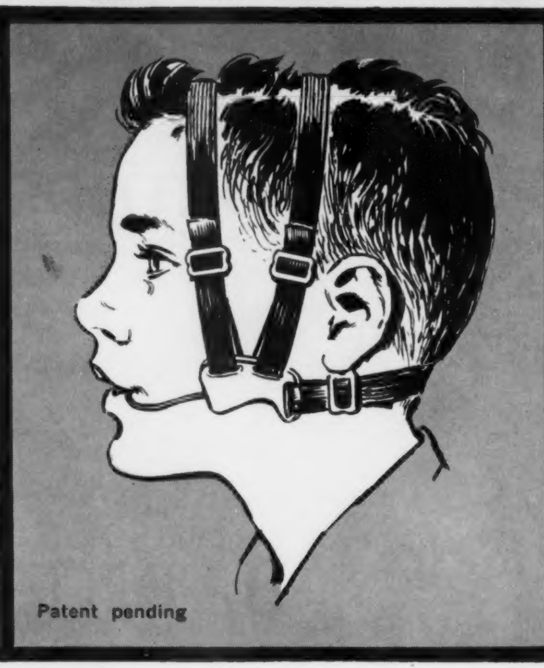

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American Journal *of* ORTHODONTICS

Vol. 45 October, 1959 No. 10

Original Articles

MAXILLARY BITE PLANE APPLICATION IN CLASS I DECIDUOUS OCCLUSION

J. Rodney Mathews, A.B., M.A., D.D.S., Berkeley, Calif.

FOREWORD

The present serial study is concerned with clinical attempts to encourage adequate lower arch development in Class I deciduous occlusion cases presenting with close-bites. There is presented a hypothesis supporting the rationale involving the use of maxillary bite planes during a time when the mandibular arch is growing actively in generalized fashion. The immediate aim is to provide a favorable developmental environment for the growth of mandibular arch length to the full potential of the patient.

Not so many years ago it was said that early treatment of malocclusion was an inverse function of our national economy. In other words, in good times the orthodontist preferentially treated the early adult dentition and did not bother with deciduous or mixed dentitions, while in periods of recession or depression the tide turned toward earlier treatment timing. This was understandable, and no doubt the claim quite truly represented the situation. So-called early treatment has always been fraught with difficulties, and it continues to present a challenge to the orthodontist. There has been no basic change in appliance design for the past several decades. True, there have been refinements in design and improvements in the physical characteristics of the materials being employed, but orthodontic mechanics are still centered about studied movement of teeth to produce the desired result with the mechanism at hand. The problem surrounding early orthodontic treatment is that of effecting a stable result which will carry over into the permanent dentition. Studies

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

attempting to prognosticate growth and developmental changes for the individual patient have not been very productive. Thus, it might appear simpler to postpone treatment until growth of the dental apparatus is essentially completed. Unfortunately, treatment of a full-blown malocclusion at this stage may well involve heroic measures to remedy a situation which might have been intercepted at a very early age. Understanding developmental progress of the dentition and surrounding structures must rest with serial studies of sufficient magnitude and scope to gain a more precise knowledge of the process. In the meanwhile, it is encouraging to note the trend toward earlier interception of malocclusion in keeping with the broader generalization that prevention is preferable to cure.

Orthodontics has been retarded as the result of misinterpretation of Brodie's serial study. Prior to this work, the orthodontist was able to blame the vagaries of malocclusion almost wholly on one environmental experience or another. Subsequent to Brodie's work, it appeared that the facial structure was almost wholly morphologically predetermined and nothing much could be done about it other than movement of teeth within their narrow confines. More careful inspection of this work has disclosed interpretative errors on the part of the profession. As is usually the case with conflicting schools of thought, the truth of environmental versus heritable effects on the developing dental apparatus lies somewhere in between. Thus, the teeth, jaws, and arches are subject to environmental effects, whether they be for good or bad. It follows that these effects must be most marked while the person is young and while he is actively growing. This does not discount the importance of genetic inheritance but, rather, suggests that the environmental effects are superimposed on inherited characteristics. It is often difficult or impossible to separate these two effects in the given person. Herein lies the basis for extended argumentation.

Early orthodontic treatment usually means treatment of the mixed dentition, and it usually means a fixed appliance of one sort or another. Tooth guidance in the hands of the pedodontist generally involves removable appliances of various designs fabricated to perform minor tooth movements or to maintain space. On the average, little or nothing is done in the way of orthodontic treatment in the deciduous dentition other than correction of cross-bites and interception of prognathism. If the orthopedist is faced with a "bone-guiding" problem (for example, alignment of the extremities), we may be certain that he will undertake treatment as soon as possible. Growth of bone and the supporting soft tissues can be guided best when the child is very young. Likewise, guidance of the developing dental apparatus can effect the greatest change with the least effort if it is begun as early as possible. The nearer one reaches the end of the growth period, the less the guiding of the developmental path is possible. Prevention rather than attempted correction of a full-blown dysplasia thereby becomes the theme. It is obvious that the limitations imposed on any guidance treatment are a function of age, health, and inherited potential. Unfortunately, we can only guess what the potential for growth in a single patient will be. The physical attributes of the

parents may help in this regard, but for the most part we are quite in the dark. Since man has thirty-two teeth, it has been said that Nature intended the individual to grow up and support this dentition. Wylie pointed out some years ago that Nature never intended anything. He was referring to the erroneous concept that the potential for correct coordinated development is present in the individual if only it is allowed to develop. In any beginning deviation from normal, the orthodontist can only hope to set the stage for coordinated growth and development and then sit back and wait. There is no scientific control in early guiding intervention for the growth process aside from what might be done with identical twins. If the orthodontist's efforts to help Nature are successful it is always possible to say that equal or even greater success could have been obtained without intervention or with intervention at a much later date. For the most part, experimental control must come from comparison with a comparable untreated group, and both groups must be subjected to statistical analysis.

Given proper interdigitation of the posterior teeth in the deciduous dentition one may expect correct interdigitation of the permanent teeth in the young adult. Ordinarily this segment of the orthodontic universe presents because of insufficient alveolar structure to support the full complement of teeth in regular fashion or else the facial protrusion accompanying a more or less good arch form has resulted in esthetic problems. One may ask himself if insufficient basal bone structure is solely an inherited phenomenon, solely an environmental matter, or a combination of both. If the latter is true, as would often seem to be the case, a sizable percentage of Class I cases with arch length deficiency might well be attributable to an unfavorable dentomuscular environment while the associated structures were actively growing. Obviously, there will be a sizable percentage of deciduous cases in which, as a result of genetic dysplasia, it will not be possible to accommodate all the teeth. It is relatively easy to prognosticate a shortage of arch length potential in the deciduous dentition where the teeth are already crowded and rotated. Likewise, one need only examine a well-developed mandibular arch with marked interdental incisal spacing to be relatively certain that the permanent successors will erupt in good alignment. The intervening shades of gray constitute the area in which we are at a loss to know whether or not the patient must one day undergo extraction of permanent teeth as an adjunct to orthodontic treatment. Presuming for the moment that there are contributing environmental effects that result in arch length deficiency, one must inquire into their nature. It has seemed to me for some years that I see clinically acceptable lower arches out of proportion to what I would expect in Class II malocclusion. This point has also been made by others.[1, 2] One must recognize that the orthodontist does not see the full gamut of Class I occlusions, since there is little or no reason for the "good ones" to seek his services.

Clinically, the lower arch dictates treatment planning with respect to extraction of permanent teeth. Time and experience have demonstrated the futility of lower arch expansion in the face of normal tone of the mouth and lip musculature. On the other hand, maxillary teeth, standing over a relatively

massive base, can tolerate considerable adjustive movement. More simply stated, if the average Caucasian child develops adequate lower arch length, subsequent extraction of permanent teeth will be dictated only by esthetic considerations or considerations other than those imposed by the upper arch per se. This generalization does not hold true in children of Oriental extraction, whose faces are so often flattened in the premaxillary area as a racial characteristic. In these children one often sees the maxillary lateral incisors in linguo-version because of insufficient arch length. Similarly, truly prognathic children or children with cleft palate often exhibit serious dysplasia between the maxillary and mandibular arches wherein the maxillary structure becomes the limiting factor.

Bone growth, as a general phenomenon, is admittedly a delicate affair subject to adverse forces regardless of their origin. It has been said in oversimplified form that when muscle and bone are pitted against each other, muscle will win. For example, if the muscles of mastication are pitted against the alveolar structure in the so-called rehabilitation case in which the bite has been opened excessively, loss of alveolar bone ensues. If severe leaning habits are established early, distortion of the alveolar arch results. If severe tongue or finger habits are established, the teeth and related bony structures are affected.

Orthodontists continue their attempts to explain treatment results on the basis of the appliance stimulating or inhibiting the growth of bone. The restraining force of headgear on the upper teeth is presumed by some to inhibit growth at the related maxillary sutures. The use of Class II elastics is presumed by some to stimulate growth at the head of the mandibular condyle. Proof of either contention is lacking, although there are certain cases suggesting both phenomena. Repeated attempts to stimulate epiphyseal growth of long bones have met with failure. A change in the local level of circulation to long bones as a result of bone fracture or infection has been demonstrated sometimes to cause accelerated growth of the affected bone. Aside from this, experimental attempts to stimulate differential bone growth have been ineffective. Attempts to inhibit epiphyseal growth of long bones are routinely successful if three bone staples are used across the epiphyseal union. One or two staples are ineffective. It becomes difficult to imagine how headcap force against the teeth will be of sufficient magnitude to inhibit sutural growth of the maxillary complex. Growth of bone, whether it be the result of sutural or cartilage activity, is still the end result of cellular multiplication and calcification.

The orthopedist cannot and would not attempt to stimulate growth of long bones by applying traction which would only result in joint injury. The very considerable excursive movement of the mandibular condylar head above and beyond that seen in other joints does not mean that it is stimulated to grow if rubber-band traction is placed against it. The miserable clinical history of bite-jumping stands as mute evidence to support this contention.

A case is sometimes made with respect to stimulation of bone growth as applied to the increase in vertical height of the alveolar process. The orthodontist may increase the vertical dimension of the dental apparatus. This, in a sense, is stimulation of bone growth. However, we must remember that this

vertical adjustive mechanism also operates independently of the orthodontist. Reconstructive dentistry to increase vertical height is limited clinically by the confines of the freeway space. Extrusion of the teeth is undoubtedly accompanied by the bony process. In terms of physical measurement, however, this is a very limited thing, and the orthodontist is stretching a point when this type of compensatory change becomes stimulation of bone growth in the ordinary sense of the word.

Adaptive change in bone growth is known to occur as the result of environmental influences. Directional warping and trabecular reorientation are but two examples. The growth of the mandibular alveolar arch as shown by intercanine tooth measurement and limited vital staining studies has indicated that generalized growth of the mandibular structure is completed within the first half-dozen years of life. Thereafter, mandibular growth appears to be limited to specific growth sites.

The crux of the present hypothesis concerns the possible environmental effects on the development of the lower arch during the crucial first six years or so in which the patient may or may not develop sufficient room to accommodate the lower permanent incisors. First let us consider the various types of occlusions in terms of vertical and anteroposterior tooth and jaw relationships with respect to the supporting musculature.

One of the outstanding features of Class I malocclusion is the close-bite. Progressive malalignment of the mandibular incisors is secondary. In this malocclusion the upper incisors are in approximation with the lower incisors, with minimal overjet. Concomitantly, the orbicularis musculature bears against the upper incisors. Thus, indirectly, muscle is being pitted against bone via the teeth.

An outstanding feature of Class II malocclusion is the protrusion of the premaxillary teeth and bony base. The bite is generally closed. In this case, however, the protrusion prevents the upper teeth from bearing on the lowers. The tongue is free to exert its expansive environmental force on the developing dentition and arch. Irrespective of the close-bite, the expansive effect of the tongue on the teeth is without question, especially in tongue-thrusting cases in which unfavorable incisor movement ensues. Notwithstanding, it is the exceptional tongue-thrusting case that lacks room for the mandibular incisors if repositioned on the ridge. In fact, the orthodontist is wary of any extraction in this type of case because of possible relapse. Conversely, in the few recorded cases of aglossia, one cannot help but be impressed by the severe crowding of both arches. Thus, it is safe to say that the tongue exerts a range of environmental muscular effect on the teeth and supporting structures.

An outstanding feature of Class III malocclusion is a dysplasia between the maxillary and mandibular arches. More often than not one sees clinically acceptable arches per se. The genetic origin of the jaw dysplasia in Class III malocclusion has been demonstrated repeatedly in familial history. Malocclusion as a whole undoubtedly has genetic origins. However, the amount and degree are probably influenced by environment. If the lower incisor segment does not grow to the limit of its inherited potential, malocclusion will result.

Since we cannot measure this potential, the best clinical move would appear to be to improve the environmental climate, as it were, wherever necessary and feasible to allow maximal developmental progress.

Our hypothesis up to this point suggests that development of adequate lower arch size is influenced by the unknown genetic potential and also by the orofacial musculature. Further, it suggests that in certain Class I close-bite cases the full potential for growth of lower arch dimension may not be realized due to the presence of a close-bite and the close approximation of the maxillary and mandibular incisors, coupled with the restrictive influence of the orbicularis oris musculature. Thus far, the hypothesis has only the nebulous backing of clinical observation suggested by what appears to be an unbalanced preponderance of clinically good lower arches in the presence of Class II malocclusion. The present trend to upper arch headgear treatment in a great percentage of Class II malocclusions reflects the high incidence of good lower arches encountered in this type of case.

It has been said that a close-bite in the deciduous dentition is normal and that bite opening may be expected in a good number of cases when the premolars have erupted, giving the dental apparatus additional vertical support. This must certainly occur on occasion, but for the most part a close-bite in the deciduous dentition portends a close-bite in the permanent dentition. In approximately twenty sets of identical twins whom I have followed for eight years during a period extending from the late deciduous and very early mixed dentition to the young adult dentition, there is not a single case in which spontaneous bite opening may be seen.

Clinically, there is considerable agreement that attempts to open the bite on a reasonably permanent basis should be undertaken while the premolars are erupting. This concept may or may not be correct, and it probably stems from observations of spontaneous bite opening during this age period. From a purely theoretical point of view, it would appear that bite opening should be most successful during periods of rapid vertical growth. Again, unfortunately, we do not know when this will be for the individual patient. Clinically, it would seem advisable to place a series of bite planes for this type of patient, to be worn intermittently during the deciduous and mixed dentition years.

The present serial study is concerned with clinical efforts to assist or guide the growth and development of the dental apparatus during a time when generalized growth of the mandible is still active. The immediate aim was to test the hypothesis that in Class I occlusions a close-bite in the deciduous dentition imposes an arresting effect on the development of intercanine width necessary for the accommodation of the lower four permanent incisors. This effect should be most marked in Class I occlusion; it should be a function of the indeterminate genetic potential which we cannot control and the dental environment over which we do have some control.

MATERIALS AND METHODS

Class I deciduous cases in children at the approximate ages of 4½ to 5½ years were obtained through the cooperation of certain local dentists. These

children presented with occlusions that were apparently normal except for close-bites. No attempt was made to define the close-bites in quantitative fashion. The patients were subdivided into two groups: (1) those with interdental

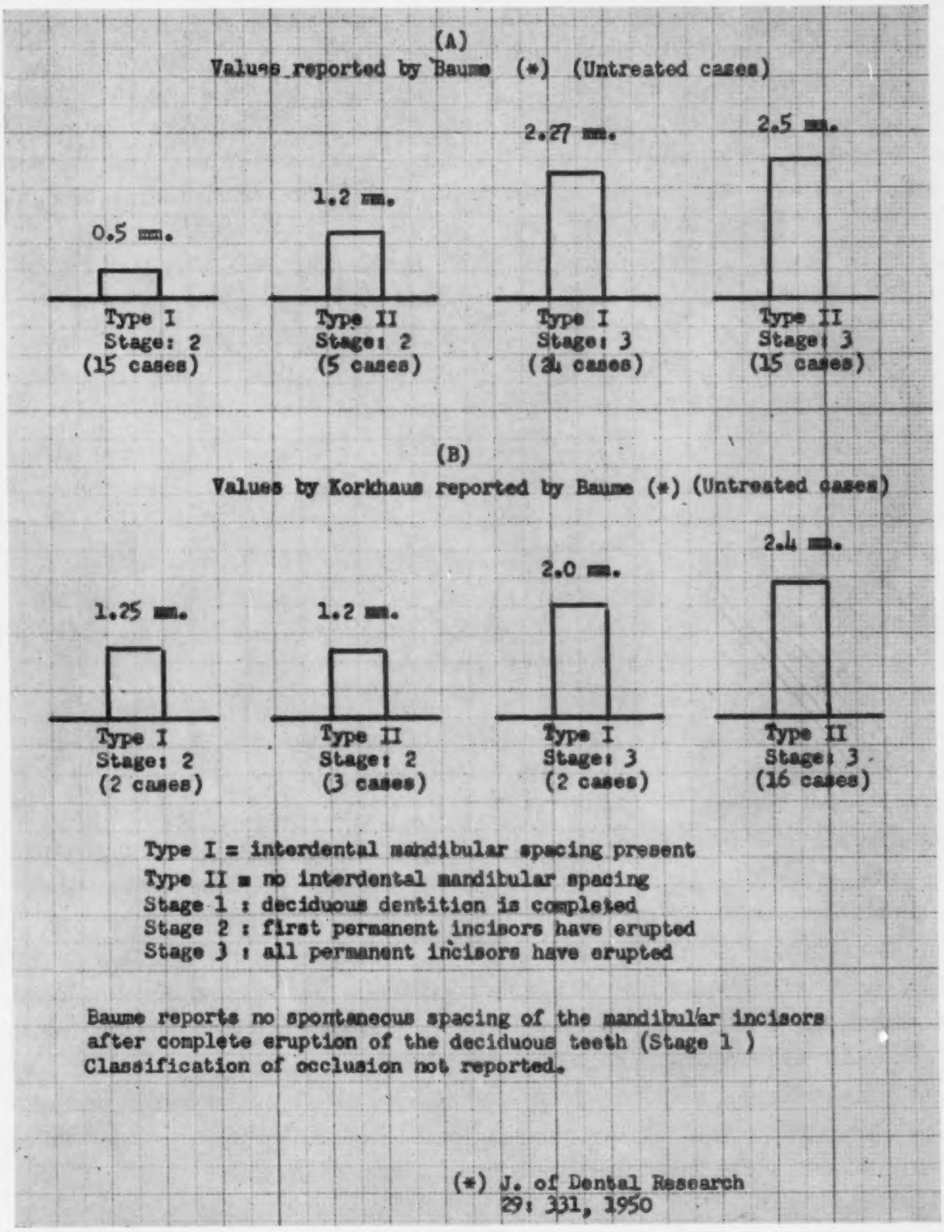


Chart 1.—Average increase in deciduous mandibular intercanine width in untreated series.

spacing and (2) those without mandibular interdental spacing. Flat maxillary bite planes placed in each case opened the bite to the level of the maxillary incisal edges or less, depending on the initial severity of closure. Freeway space, as such, was ignored in the fabrication of these removable appliances,

since the children uniformly tolerated whatever degree of opening was incorporated in the plane. All patients were seen every two months; the retainers were remade whenever necessary as dictated by the need periodically to increase the height of the plane. On the average, each patient required two or three retainers, depending on the need for change and as the result of occasional loss. It should be mentioned that children at this age are far superior to older children in accommodating to and consistently wearing the appliance. Final evaluation for each case would come at a time when all four incisors were well erupted. It is felt that once the four lower incisors are well erupted in regular fashion, one can be almost certain that the remaining succedaneous teeth will be accommodated without incident. It has been pointed out to me that since the initial bite opening is an artificial thing, one may well expect the bite to close when the appliance is withdrawn. This may be expected, but if the hypothesis is correct, any gains in mandibular intercanine width realized at a time when generalized mandibular growth is in progress should be maintained since the teeth would still be well over supporting alveolar bone.

The need for a control group in a study of this nature is evident. Fortunately a serial study of untreated deciduous dentitions has been reported by Baume.[3] This serves as a frame of reference or standard with which the present experimental group may be compared. Chart 1, compiled from Baume's serial data, shows the average increase in deciduous mandibular intercanine width in fifty-nine cases followed serially from the completed deciduous dentition until the four permanent mandibular incisors were erupted. Baume divided the cases into two groups, depending on whether interdental incisal spacing was present or absent initially. He subdivided the cases into stage 1 (deciduous dentition completed), stage 2 (mandibular central incisors erupted), and stage 3 (four lower incisors erupted). The Type I group included those presenting with spacing between the lower deciduous incisors. His Type II group consisted of those without deciduous interdental spacing. It is noteworthy that no spontaneous spacing of the deciduous mandibular incisors was seen after complete eruption of the deciduous teeth. "There was no increase in interdental space in those arches with separated teeth and no spacing developed in the arches in which teeth were in contact." Baume's statement that most of the Type II cases (without mandibular incisal spacing) may fall within Angle's Class I malocclusion may be interpreted as supportive evidence for the present hypothesis, since these are the cases with little or no overjet. Unfortunately, Baume did not relate these cases in terms of degree of overbite.

RESULTS

Chart 1, compiled from Baume's material, shows a mean increase in mandibular intercanine width of 2.27 mm. in Type I cases (range, 0 to 3.0 mm.) extending from stage 1, when the deciduous dentition was completed, through stage 3, when the four lower incisors were erupted. Similarly, there was an increase of 2.5 mm. in Type II cases (range, 0 to 5.0 mm.) from stage

1 through stage 3. This was for a total of thirty-nine cases. An increase of 0.5 mm. is seen in the Type I group between stages 1 and 2 (from completion of the deciduous dentition to eruption of the central incisors). An increase of 1.2 mm. is seen in the Type II cases during the same stage interval. Baume shows these data in agreement with the earlier work of Korkhaus and Neuman which has been compiled in the lower half of Chart 1. Forty-three per cent of the Type II cases developed crowding, while all of his Type I cases developed properly aligned permanent incisors.

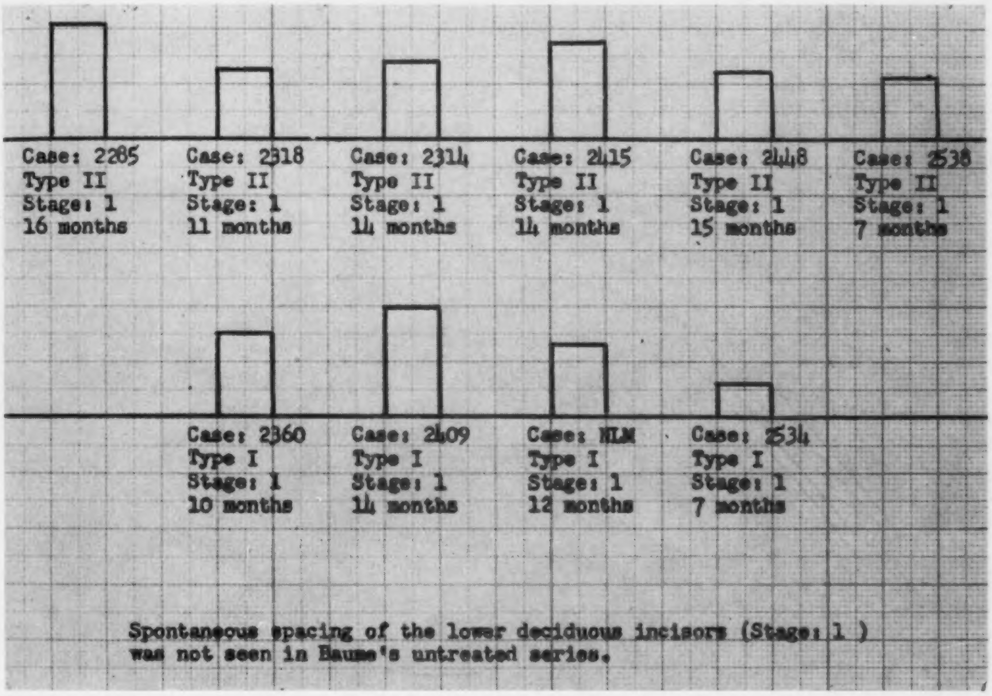


Chart 2.—Increase in deciduous mandibular canine width in Class I cases treated with Hawley bite planes. Stage 1 (Baume).

Chart 2, compiled from the present study on an individual case basis, shows an average increase in mandibular intercanine width of more than 1 mm. prior to the eruption of any permanent incisors in ten cases under bite plane treatment. Visible interdental spacing is seen in the models. The increase in intercanine width ranges from a maximum of 2.0 mm. with sixteen months of treatment to a minimum of 0.5 mm. with seven months of bite plane therapy. As one might expect, the increase in dimension varied from case to case and is not a straight-line function of treatment time.

Chart 3 shows marked increases in mandibular intercanine width in fifteen Type I and Type II cases under bite plane treatment for a mean of nineteen months (range, twenty-nine to nine months). The dimensional increases from stage 1 to stage 2 are seen to range from 3.5 to 1.2 mm. Again,

the increase in width varies from case to case and is not a direct function of time. Each case has exceeded the average reference value shown in Baume's untreated series.

Chart 4 shows nine cases of both types which have worn maxillary bite planes more or less continuously from late stage 1 into stage 3 with the four lower incisors erupted or partially erupted. From clinical observation, it

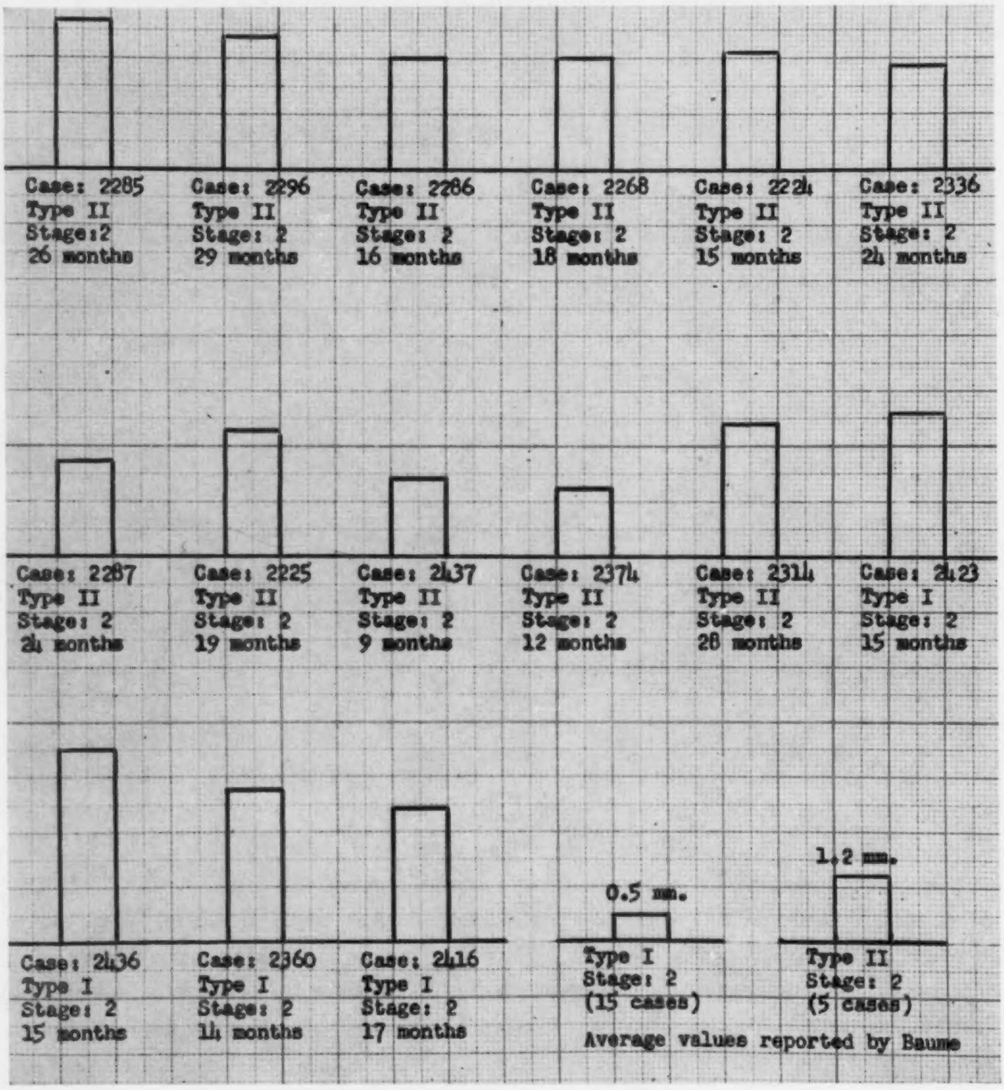


Chart 3.—Increase in deciduous mandibular canine width in Class I cases treated with Hawley bite planes. Stage 2 (Baume).

appears that all nine will accommodate the lower four incisors with either minimal or no crowding. Treatment time averaged twenty-eight months (range, fifty to thirteen months). The increase in intercanine width ranged from 4 mm. to 2.5 mm., varying from case to case and not directly related to time.

Chart 5 shows a single case in which a series of bite planes have been worn for over five years. The patient presented with a Class I deciduous occlusion. The bite was closed, and there was no deciduous interdental spacing (Type II). The treatment objective was to establish better upper and lower face proportionality in a case which obviously lacked balance.

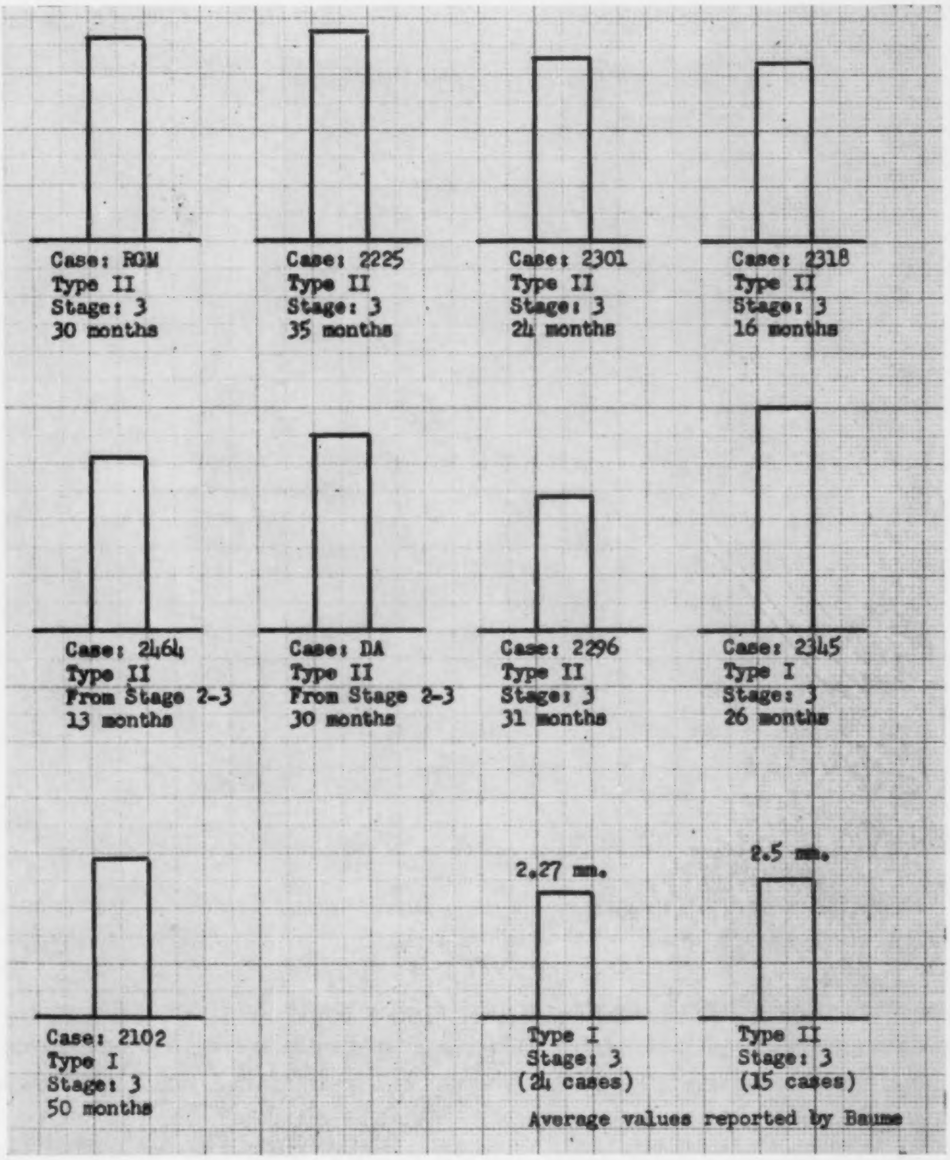


Chart 4.—Increase in deciduous mandibular canine width in Class I cases treated with Hawley bite planes. Stage 3 (Baume).

Bite plane therapy was undertaken prior to the conception of the present hypothesis, without thought to the possible developmental increase in mandibular intercanine width. Thus, it is the only long-term case, since the present

series is of only about two and one-half years' duration. The chart shows a gain to 10 mm. in intercanine width between the ages of 5 and 10 years. Unfortunately, progress records were not taken and there is no way to know the time distribution with respect to the incremental increase in canine width. The permanent dentition is all but completed, and the photographs show the dentition well over supporting bone. Face photographs disclose excellent proportionality in facial height.

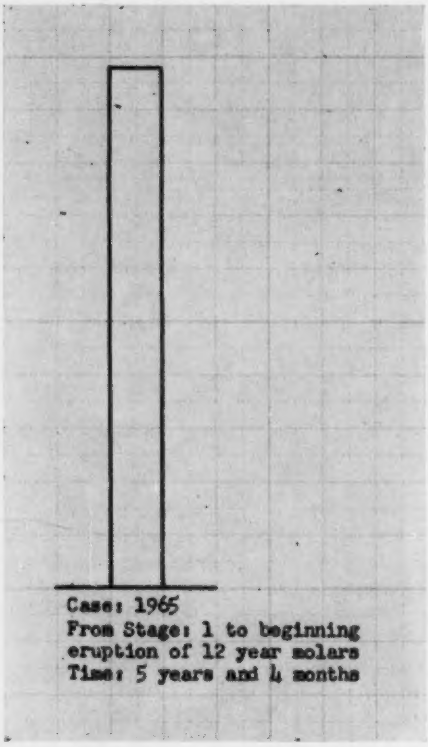
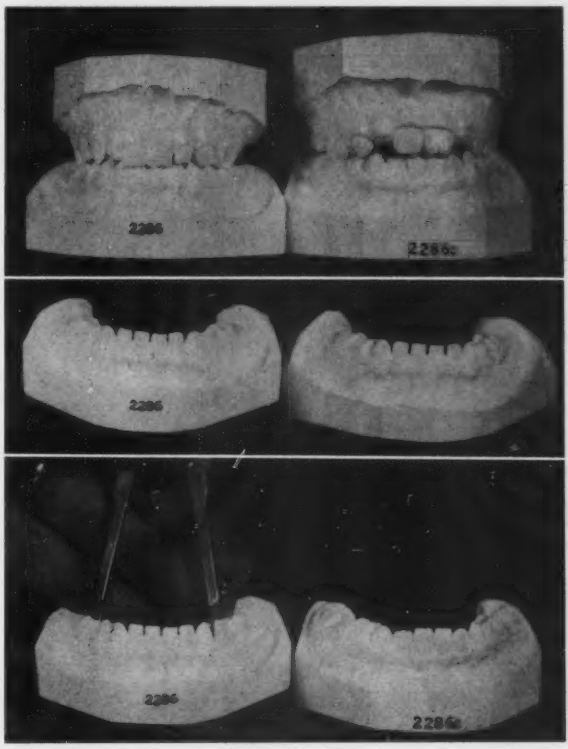


Chart 5.—Increase in mandibular canine width in a single Class I case treated with a series of Hawley bite planes from the late deciduous to the early permanent dentitions.

Cases 2102 and 2345, with an elapsed time of fifty months and twenty-six months, respectively, received bite plane treatment in conjunction with upper arch headcap treatment to reduce Class II malocclusion. Both cases presented with very severe close-bites in the deciduous dentition. These cases are included as a demonstrably beneficial adjunct in treatment where incipient mandibular arch length deficiency is apparent in the late deciduous dentition.

The increase in intercanine width in these cases is expressed both laterally and anteroposteriorly, with the greater component being in the lateral direction. Case 2224 (Chart 3) was discontinued at early stage 3 when the lower right central incisor was displaced labially by the lateral incisor and developed a so-called labial "runner." The deciduous canines were extracted, and an effort was made to bring the tooth lingually over

supporting bone. Tooth movement was accomplished, but tissue reattachment did not ensue. This was the only case in which untoward effects developed. Once the lower incisors are freed partially from the restricting influence of the upper arch with the bite plane in place, the possibility of untoward tooth movement exists. The patient should be seen at regular monthly intervals while the lower lateral incisors are erupting if there is cause for possible concern.



A.

B.

C.

Fig. 1.—Case 2286.

A, From stage 1 to stage 3, showing change in vertical relationship. Four lower incisors will be accommodated with minimal or no crowding.

B, Stage 1, showing increased interdental spacing during bite plane therapy.

C, From stage 1 to stage 3, showing increase in intercanine width.

DISCUSSION AND SUMMARY

It appears that maxillary bite plane therapy is an effective means to permit more favorable development of the lower arch in deciduous Class I close-bite cases. The gains in all three stages of lower incisor eruption, especially in Type II (without deciduous mandibular incisor spacing) above the average, suggest validity in the hypothesis that mandibular arch length is not fully developed in Class I close-bite cases. This also appears to be true in deciduous Class II cases in which the bite is deeply closed up into the palatal tissue.

It has been pointed out that spontaneous mandibular interdental spacing does not occur.[3, 4] Spacing of the deciduous mandibular incisors was seen in every case in the present study as a result of maxillary bite plane therapy.

Initially, this increase in intercanine width may be interpreted as tooth movement alone. If the cases are considered on a longer-term basis, however, extending from the late deciduous dentition to the completion of eruption of the lower four incisors, the final intercanine width is too great to have accommodated the anterior segment on the smaller original alveolar base.

The second point to be considered centers about the possibility that the new intercanine width would have been developed irrespective of the bite plane therapy. In the final analysis, there is no defense for objections on this score.

A.

B.

C.

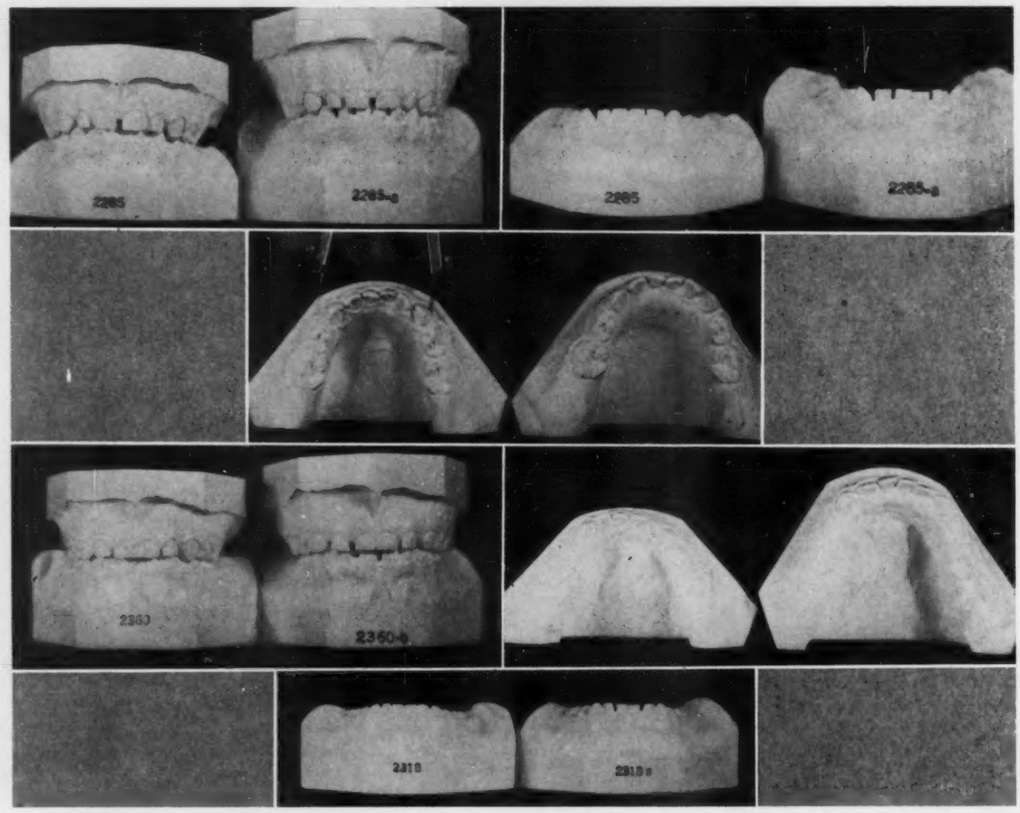


Fig. 2.—*A*, Case 2285 during stage 1. Note change in vertical relationship, development of interdental spacing, and increase in mandibular intercanine width during maxillary bite plane therapy.

B, Case 2360 from stage 1 to stage 3. The four lower incisors will be accommodated on the ridge with minimal or no crowding.

C, Case 2318 during stage 1 showing development of interdental spacing.

Somewhat less than 50 per cent of Baume's Type II cases (without primary interdental spacing) failed to accommodate the lower permanent incisors. All of his Type I cases did accommodate the lower permanent incisors. Unfortunately Baume's group and the present series are not truly comparable. Some of his cases were Class II and others were Class I, but he did not relate the occlusion and degree of bite closure to the two basic types of case.

It should be made clear that I do not propose bite plane therapy as a method to stimulate growth of bone. Theoretically, the increases shown in each

A.
B.
C.

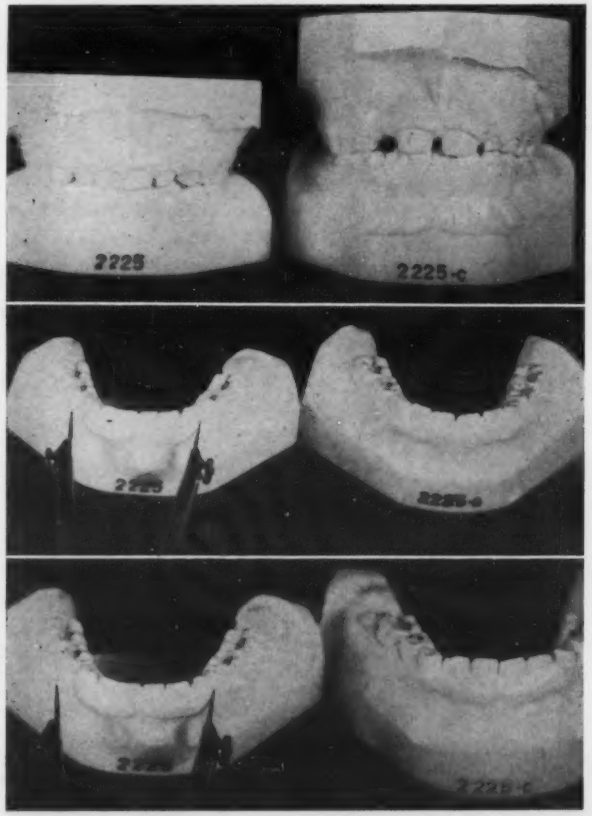


Fig. 3.

A.
B.
C.

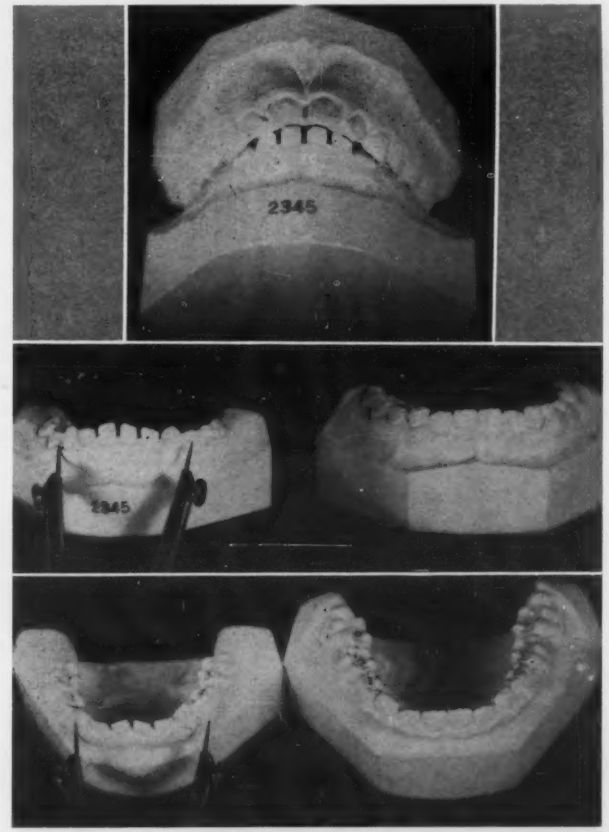


Fig. 4.

Fig. 3.—Case 2225.

A, From stage 1 to stage 3, showing change in vertical relationship. Four lower incisors will be accommodated with minimal or no crowding.

B, From stage 1 to stage 2, showing increased intercanine width during bite plane therapy.

C, From stage 1 to stage 3, showing increased intercanine width during bite plane therapy.

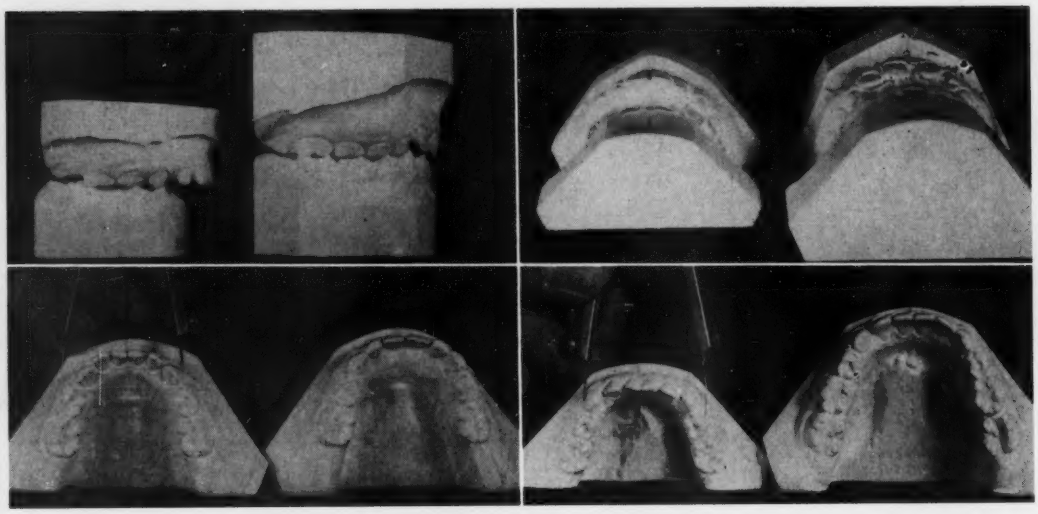
Fig. 4.—Case 2345. Class II, Division 1 case treated with full maxillary banding and occipital headgear in conjunction with maxillary bite plane. No active treatment mechanics employed in the lower arch.

A, Front view showing deep overbite and overjet.

B, Front view of lower arch from stage 1 to stage 3, showing increase in intercanine width and flattening of the curve of Spee.

C, Semiocclusal view of lower arch showing increase in intercanine width and improved arch form. The four incisors will be accommodated with minimal or no crowding.

A. B.



C. D.

Fig. 5.—Case 2102. Class II, Division 1 case treated with full maxillary banding and occipital headgear in conjunction with maxillary bite plane. No active treatment mechanics employed in the lower arch.

A, Lateral view showing changes from stage 1 to stage 3.

B, Occlusal view showing changes in overbite and overjet from stage 1 to stage 3.

C, Occlusal view of lower arch from stage 1 to stage 2, showing increase in intercanine width.

D, Occlusal view of lower arch from stage 1 to stage 3, showing increase in width and accommodation of the four permanent incisors well over the ridge.

A.

B.

C.

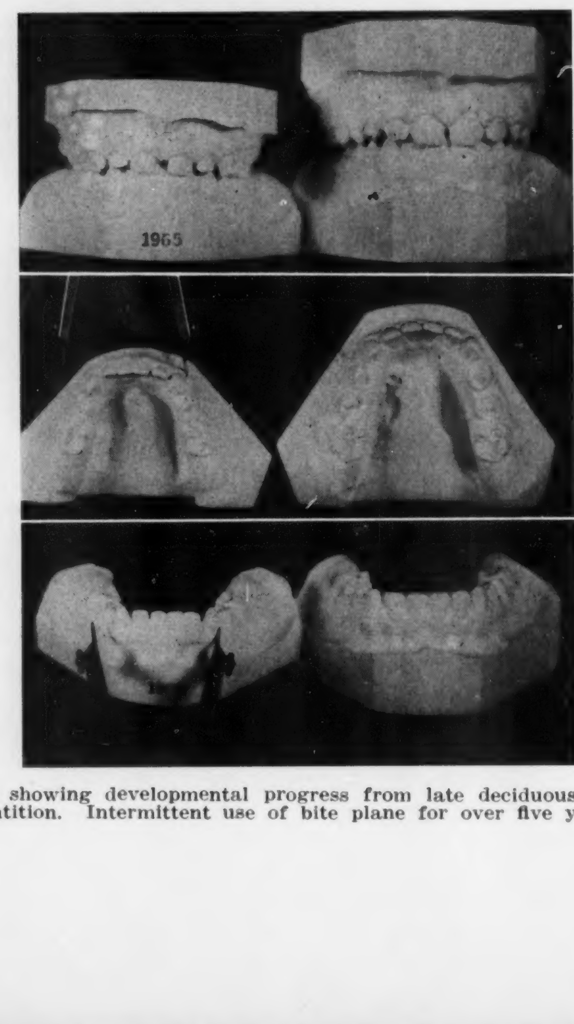


Fig. 6.—Case 1965 showing developmental progress from late deciduous to early permanent dentition. Intermittent use of bite plane for over five years.

stage should not exceed the mean values shown by Baume. The numbers of cases at stage 3 in the present work are too small to be subjected to statistical treatment. It is tempting to ascribe the marked increases in intercanine width to a kind of "catching-up" process in lower arch development, but there is no basis in fact for doing so. The bite opening, per se, gained in the present therapy may not necessarily hold. On the other hand, if the new intercanine dimension has been accompanied by the bony supporting base, one need have no fear of relapse in terms of incisal crowding. It appears to me that the early closed-bite is a significant developmental stumbling block in Class I occlusion and perhaps even more so in severe Class II occlusions where the lower incisors bite high into the soft palatal tissue. Observation of the entire series of cases and of additional new cases is being continued through completion of stage 3. A more critical appraisal of the work will be possible when this has been completed. Should the present work be substantiated by others, this type of therapy could be carried on by competent pedodontists rather than by orthodontists who would not ordinarily be seeing Class I close-bite deciduous dentitions. Our time will have been well spent if we, as orthodontists, can open another approach toward preventive orthodontics and yet not try to convince ourselves or others that this or any other measure of prevention will be 100 per cent effective.

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A QUANTITATIVE METHOD FOR THE EVALUATION OF THE SOFT-TISSUE FACIAL PROFILE

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INTRODUCTION

THE first important contribution to the study of the facial profile was the work of the Dutch anatomist, Camper,[1] who in the latter part of the eighteenth century devised a means for comparing the profiles of mammals. A line from the center of the external auditory meatus to the wing of the nose (Camper's plane) and another line from the glabella to the alveolar margin of the upper jaw formed Camper's angle. This angle was used to demonstrate racial differences as well as various evolutionary changes in human faces.

A short time later Retzius, a Swedish anatomist, classified the races of man into *orthognathic,* the straight-jawed, and *prognathic,* the prominent-jawed.

Since there were several horizontal planes of reference in addition to the one first introduced by Camper, the anthropologists and anatomists of that time soon realized that it would be a good idea to standardize these planes of reference in order to compare their craniometric findings. At the International Congress of Anthropology held in Frankfort in 1884, the horizontal line introduced by Von Ihering in 1872 was selected. This plane is also known as the Frankfort horizontal plane and is drawn through the upper margins of the ear holes and the lower left infraorbital margin.

The next important work by the group of European investigators was that of Dreyfus, who in 1922 drew a vertical plane through nasion perpendicular to the Frankfort plane for measuring profile changes. At about the same time Simon[2] oriented the face in three planes of space—the orbital, the median sagittal, and the Frankfort horizontal planes. Although at the time he introduced his gnathostatic method Simon caused considerable controversy because of certain inaccuracies discovered in its use, his brilliant work is accepted widely and will be assured of a lasting place in orthodontic annals.

During the early twentieth century in American orthodontic practice, as can be judged from the texts of Angle[3] and Case,[4] there was a great awareness

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

of the effect of malocclusions on facial form, but no quantitative methods for assessing facial changes were in use. Angle[3] devotes an entire chapter to this subject and writes as follows:

> We know that while all human faces are greatly alike, yet that all differ. Lines and rules for their measurement have ever been sought by artists, and many have been the plans for determining some basic line or principle from which to detect variations from the normal, but no line, no measurement admits of anything nearly like universal application. The beautiful face of the Apollo Belvidere has been very largely used as a guide toward the ideal and from which to judge variations, but this is impracticable and misleading, for, notwithstanding the beautiful harmony of proportions of that face, with its straight line touching the frontal and mental eminences and the middle of the wing of the nose, its range of application has been found to be very limited in gaging the harmony or inharmony of other faces.

Case,[4] in his text, devotes a section entitled "Dentofacial Malocclusions" to facial analysis and describes zones of movement where he feels that orthodontic treatment will produce the greatest changes. An interesting observation which he makes is that slight changes in the profile will produce considerable improvement in the facial appearance. He does not employ the use of measurements and, like Angle, relies more upon training one's power of observation to determine facial changes.

By adopting scientific methods of measurement employed by anthropologists, Hellman[5] in 1927 reported his findings on growth and development in the human face.

With the introduction of the cephalometer by Broadbent[6] in 1931 and the application of his original technique for analyzing cephalometric radiographs, a new era in orthodontic thinking began. The Broadbent analysis was followed by several other important and outstanding methods for evaluating lateral headplates. Downs, Wylie, Margolis, Björk, Riedel, Steiner, and Sassouni have all contributed valuable methods for analysis, some of which have practical clinical applications. A detailed account and comparative study of all these analyses will be found in a syllabus compiled by Krogman and Sassouni.[7]

It will be noted that in recent years emphasis has been placed on hard-tissue craniofacial analysis, with very little attention devoted to the soft-tissue profile by quantitative methods of analysis.

FACIAL PROFILE ANALYSIS

The role of the hard skeletal structure in influencing facial form is a recognized and accepted fact. However, one must not lose sight of the soft-tissue covering which forms the external surface of the face. Anthropologists have shown us that the external covering made up of integument, adipose tissue, connective tissue, and muscle does not always distribute itself in a uniform, orderly manner. There are great variations in the amount and distribution of these soft-tissue elements. Therefore, a facial profile analysis that is limited to measurements on the hard skeletal structure would not appear to conform to the standards of scientific accuracy if an assessment of the soft-tissue profile were required. With this thought in mind, my study was undertaken several

years ago with the intention of formulating a method for soft-tissue profile analysis. On deciding on a method for this analysis, I gave great consideration to its practicability, simplicity, accuracy, and clinical application.

A group of persons with excellent occlusions and other groups with malocclusions were examined by this soft-tissue profile analysis, and norms, means, deviations, and ranges were calculated in accordance with statistical methods.

It is not within the scope of this project to differentiate between changes due to treatment and those due to growth. Alterations in the soft-tissue profile in posttreatment records will be regarded as the result of orthodontic treatment implemented by growth.

PROFILE PHOTOGRAPHY

In order to make a soft-tissue profile analysis on a photograph, it is necessary to have a well-defined black and white photograph about one-third to one-half life size. Although the small color transparencies are very attractive and appeal to the esthetic sense, they cannot be considered adequate for recording facial changes in an accurate, quantitative manner. The miniature color transparencies do serve well in showing intraoral views and in demonstrating serial changes in tooth movement, but they cannot replace the large black and white photograph on which lines and angles must be drawn and measured.

It is very important in this analysis to prepare the patient properly so as to get a photograph with a sharp profile outline. The skin markings for orbitale and tragion are placed and then the patient is seated in a straight-backed chair with a headrest. The patient is instructed to place his teeth in occlusion and to keep the lips relaxed and closed without exerting any undue force. If, because of the severity of the malocclusion, the lips cannot be closed, the picture is taken with the lips in a parted position, maintaining occlusal contact.

The head is so positioned that the Frankfort plane is parallel to the floor and the median sagittal plane of the patient is parallel to the plane of the film, with the optical axis of the camera lens passing through orbitale. Salzmann[8] covers the technique for photostatic photography in detail in his book.

The recommended background for the subject is a light, white background. A white window shade will serve very well for a background and it can be as close as about 1 foot behind the subject's head.

Lighting for profile photography is more effective if the photoflood light is adjustable and can be brought to about a 45 degree relationship with the subject. When the light is brought to this position at about the level of the camera, the profile will be well delineated against the light background.

If orientation points have not been placed on the subject prior to photographing, it is still possible to do this on the print. Select a point under the eye, about the width of the opening between the upper and lower eyelids, for orbitale. For tragion, select the midpoint on the upper edge of the external auditory meatus. These points will be in approximate position for drawing the Frankfort plane.

For direct measurement of the soft-tissue profile, it is best to have the photograph printed on a white, semi-matte enlarging paper. Velour Black A and Varigam A are particularly good for this purpose and make it very easy to draw the necessary lines and angles.

It is not possible to draw lines on a glossy photograph unless it has been treated with retouching fluid, which gives the paper "tooth." There is also a spray, which can be purchased in photography shops, for imparting a matte finish.

Those who do not wish to mar the photograph can attach a good grade of tracing paper to the picture and the necessary lines and angles can then be inscribed on the print.

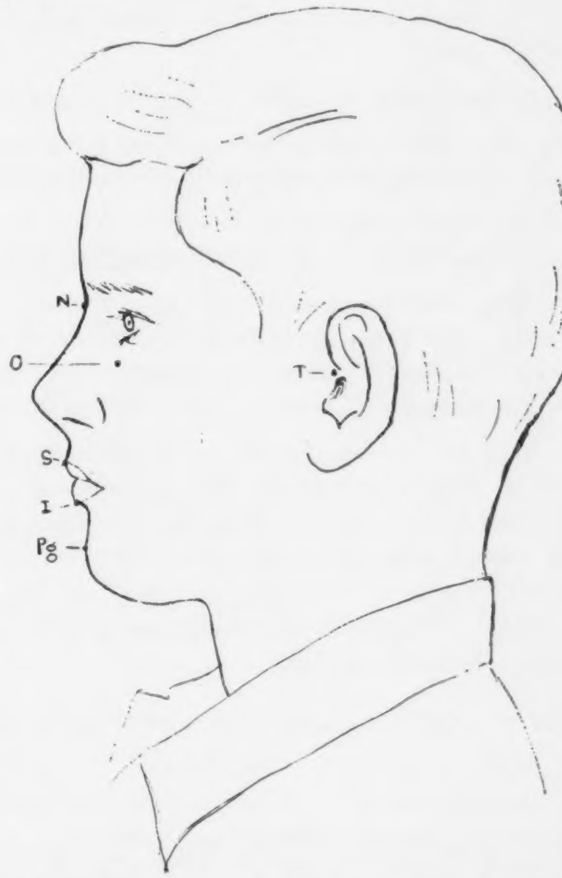

Fig. 1.—Soft-tissue profile reference points. *N*, Nasion; *O*, orbitale; *T*, tragion; *S*, labrale superius; *I*, labrale inferius; *Pg*, pogonion.

PROFILE REFERENCE POINTS

Although there are several points on the soft-tissue profile that can be measured and are frequently used in anthropometry, these were kept to a minimum in this study and include only those points at which orthodontic treatment seems to produce its greatest effect. The inclusion of too many nonessential points and lines will often tend to obscure the areas of primary concern. Brodie[9] concluded, after his investigations, that orthodontic treatment

is limited to the alveolar process. With this in mind, attention is focused on the subnasal and pogonial areas. The upper lip, the lower lip, and the chin are selected as especially important points to observe in this analysis. These are further oriented to the face and cranium by selecting nasion and the line drawn through orbitale and tragion (Frankfort plane).

The following reference points, with symbols, are used in this analysis (Fig. 1):

Nasion (N). The point at the root of the nose in the region of the fronto-nasal suture at the median sagittal plane.

Orbitale (O). The lowest point on the margin of the orbit. It is directly below the pupil when the eye is opened and the patient is looking directly ahead.

Tragion (T). The depression or notch above the tragus of the ear.

Labrale superius (S). The point on the upper lip lying on the median sagittal plane at the upper margin of the vermilion border.

Labrale inferius (I). The point on the lower lip lying on the median sagittal plane at the lower margin of the vermilion border.

Pogonion (Pg). The most prominent and anterior point on the contour of the chin. (In cases where there is a deficiency in the mandible with no well-defined chin prominence, the most anterior point below the mentolabial sulcus is selected for this landmark.)

The reference points are placed directly on a photograph, on a cephalometric radiograph, or on a piece of tracing paper attached to either. One line is drawn through orbitale and tragion to form the Frankfort plane (FH), another is drawn from nasion to labrale superius to form NS, a third is drawn from nasion to labrale inferius to form NI, and the last line is drawn from nasion to pogonion *(NPg)*. The intersections of these lines form several profile angles which will be described below (Fig. 2).

RELATIONSHIP OF PROFILE ANGLES TO CRANIOFACIAL LANDMARKS

Superior labial angle (angle S). The inferior, inner facial angle formed by the intersection of a line drawn from nasion (N) to labrale superius (S) and Frankfort plane (FH).

Inferior labial angle (angle I). The inferior, inner facial angle formed by the intersection of a line drawn from nasion (N) to labrale inferius (I) and Frankfort plane (FH).

Pogonial angle (angle Pg). The inferior, inner facial angle formed by the intersection of a line drawn from nasion (N) to pogonion (Pg) and Frankfort plane (FH).

In order to relate thoroughly one important reference point to the other after these profile angles are measured, three additional angles are included for measurement. The relations which develop between upper lip and lower lip,

upper lip and pogonion, and lower lip and pogonion are measured either directly with a protractor or by the easier method of calculating the differences in size between the original profile angles. This will be more clearly understood as we proceed further.

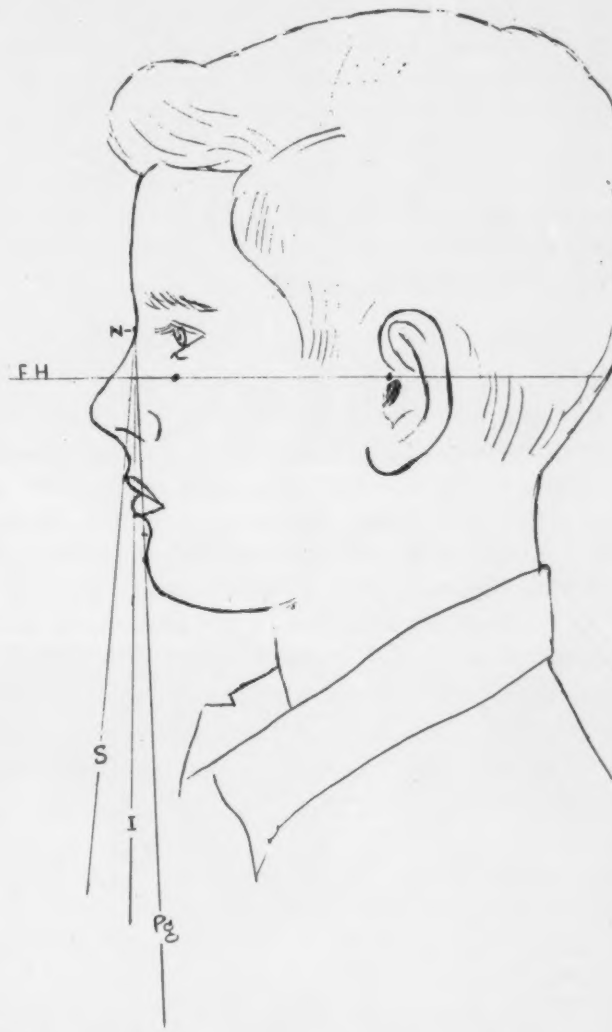

Fig. 2.—Soft-tissue profile angles: *S*, Superior labial angle; *I*, inferior labial angle; *Pg*, pogonial angle; *SNI*, labrale superius to labrale inferius; *INPg*, labrale inferius to pogonion; *SNPg*, labrale superius to pogonion.

RELATING PROFILE REFERENCE POINTS BY ANGULAR MEASUREMENTS

Labrale superius to labrale inferius (angle SNI). This relationship is established by measuring angle SNI directly and also by obtaining the angular difference between the profile angles, S and I.

Labrale inferius to pogonion (angle INPg). This relationship is established by measuring angle INPg directly and also by obtaining the angular difference between profile angles, I and Pg.

Labrale superius to pogonion (angle SNPg). This relationship is established by measuring angle SNPg directly and also by obtaining the angular difference between profile angles, S and Pg.

From the examination of normal subjects with excellent occlusions, it was learned that in the majority of cases examined the upper labial angle is anterior and larger than the lower labial angle and the pogonial angle; the lower labial angle is anterior and larger than the pogonial angle. By using these normal relationships as our guide, all differences between upper lip, lower lip, and pogonion will be expressed in plus values if they conform with the arrangement described above. However, if the upper labial angle is smaller than the lower labial angle or the pogonial angle, the angular difference will be expressed in minus values. Minus values will also apply in a situation where the pogonial angle is larger and anterior to the lower labial angle.

SOFT-TISSUE PROFILE ANALYSIS ON SEVERAL GROUPS

The first group selected for examination consisted of forty-eight young male and female subjects with clinically excellent occlusions based upon an examination of their dentitions. In this survey an attempt was made to get a good, acceptable, average profile and not necessarily to limit our sample to the straight profile often referred to as the "Hollywood profile." Since we are dealing with the average population in our practices, values obtained by examining a part of this group with clinically normal occlusions and good, acceptable profiles would appear to be more realistic than if we limited our sample to those with the ideal straight profiles.

Mixed dentitions and orthodontically corrected dentitions were not included in the normal sample. All subjects were of Caucasian race and American birth. The average age of this group was 12.4 years. Oriented photographs were taken and measurements were made. The results of these measurements are found in Table I.

TABLE I. SOFT-TISSUE PROFILE ANALYSIS USED ON NORMAL OCCLUSIONS

Age:	*Sex:*
Mean 12.4 years	Males 15
Range 9 to 16 years	Females 33
Race: Caucasian	Total 48

ANGLE	RANGE (DEGREES)	MEAN (DEGREES)	STANDARD DEVIATION (DEGREES)	STANDARD ERROR OF MEAN (DEGREES)
S	90 to 102	96.8	2.9	0.28
I	86 to 99	92.9	3.0	0.43
Pg	81 to 95	88.1	3.0	0.45
SNI	2 to 7	+3.9	1.3	0.19
INPg	2 to 8	+4.8	1.7	0.25
SNPg	4 to 12	+8.7	1.9	0.27

To illustrate the great variability in our normal group with excellent occlusions, Figs. 3 and 4 are selected to demonstrate persons with straight soft-tissue profiles and Figs. 5 and 6 are used to show those with the receded, backward-divergent profiles.

Fig. 3.

Fig. 4.

Fig. 3.—Normal occlusion with straight profile. Profile angles: *S*, 93 degrees; *I*, 90 degrees; *Pg*, 88 degrees; *SNI*, 3 degrees; *INPg*, 2 degrees; *SNPg*, 5 degrees.

Fig. 4.—Normal occlusion with straight profile. Profile angles: *S*, 94 degrees; *I*, 91 degrees; *Pg*, 88.5 degrees; *SNI*, 3.0 degrees; *INPg*, 2.5 degrees; *SNPg*, 5.5 degrees.

Fig. 5.

Fig. 6.

Fig. 5.—Normal occlusion with retruded, backward-divergent chin. Profile angles: *S*, 93 degrees; *I*, 89 degrees; *Pg*, 84 degrees; *SNI*, 4 degrees; *INPg*, 5 degrees; *SNPg*, 9 degrees.

Fig. 6.—Normal occlusion with retruded, backward-divergent chin. Profile angles: *S*, 93 degrees; *I*, 89 degrees; *Pg*, 83 degrees; *SNI*, 4 degrees; *INPg*, 6 degrees; *SNPg*, 10 degrees.

The subjects used in the examination of Class II, Division 1 malocclusions were selected from my office records. Photographs were measured in accordance with the soft-tissue profile analysis described in this article. The results of this study are included in Table II.

TABLE II. SOFT-TISSUE PROFILE ANALYSIS USED ON CLASS II, DIVISION 1 MALOCCLUSIONS

Age:			*Sex:*	
Mean 11.8 years			Males	24
Range 9 to 16 years			Females	19
Race: Caucasian			Total	43

ANGLE	RANGE (DEGREES)	MEAN (DEGREES)	STANDARD DEVIATION (DEGREES)	STANDARD ERROR OF MEAN (DEGREES)
S	92.0 to 107.0	99.6	3.4	0.52
I	86.5 to 98.0	92.6	3.5	0.53
Pg	80.0 to 93.0	86.4	2.9	0.48
SNI	3.0 to 11.5	+ 7.0	2.2	0.32
INPg	2.0 to 11.0	+ 6.2	2.0	0.31
SNPg	10.0 to 18.5	+13.2	2.2	0.34

Figs. 7 and 8 were selected from the group of Class II, Division 1 malocclusions to demonstrate the marked retrusion of the mandible which is frequently found in this classification. In contrast to the backward divergence of the mandible, Figs. 9 and 10 illustrate those in the group with well-developed, prominent mandibles. These emphasize the great variability of facial form within this class.

The sample used in the analysis of Class II, Division 2 malocclusions was selected from office records. Measurements were taken on oriented photostatic photographs and are included in Table III.

TABLE III. SOFT-TISSUE PROFILE ANALYSIS USED ON CLASS II, DIVISION 2 MALOCCLUSIONS

Age:			*Sex:*	
Mean 12.8 years			Males	6
Range 10 to 17 years			Females	8
Race: Caucasian			Total	14

ANGLE	RANGE (DEGREES)	MEAN (DEGREES)	STANDARD DEVIATION (DEGREES)	STANDARD ERROR OF MEAN (DEGREES)
S	90 to 101	96.3	2.9	0.78
I	85 to 97	90.7	3.1	0.82
Pg	80 to 92	85.8	3.6	0.96
SNI	4 to 8	+ 5.6	1.3	0.34
INPg	2 to 7	+ 4.9	1.4	0.37
SNPg	7 to 14	+10.5	1.9	0.50

The profile study in Fig. 11 is an example of a Class II, Division 2 subject used in this survey.

The group of subjects used in the evaluation of Class III malocclusions were taken from office records. Measurements for this series were taken from oriented photographs. The analysis of this group appears in Table IV.

Fig. 12 represents a severe Class III malocclusion selected from the group surveyed in this study.

Fig. 7.

Fig. 8.

Fig. 7.—Class II, Division 1 malocclusion with retruded, backward-divergent chin. Profile angles: *S*, 103 degrees; *I*, 94 degrees; *Pg*, 87 degrees; *SNI*, 9 degrees; *INPg*, 7 degrees; *SNPg*, 16 degrees.

Fig. 8.—Class II, Division 1 malocclusion with retruded, backward-divergent chin. Profile angles: *S*, 98 degrees; *I*, 92 degrees; *Pg*, 86 degrees; *SNI*, 6 degrees; *INPg*, 6 degrees; *SNPg*, 12 degrees.

Fig. 9.

Fig. 10.

Fig. 9.—Class II, Division 1 malocclusion with well-developed chin. Profile angles: *S*, 97 degrees; *I*, 90 degrees; *Pg*, 86 degrees; *SNI*, 7 degrees; *INPg*, 4 degrees; *SNPg*, 11 degrees.

Fig. 10.—Class II, Division 1 malocclusion with well-developed chin. Profile angles: *S*, 98 degrees; *I*, 95 degrees; *Pg*, 94 degrees; *SNI*, 3 degrees; *INPg*, 1 degree; *SNPg*, 4 degrees.

OTHER INTERESTING FINDINGS

Comparison of the measurements of one group with those of the other in this survey leads to some interesting findings. Angle S, which relates upper lip to cranium, measured 96.8 degrees in the normal sample and 96.3 degrees in the Class II, Division 2 sample, which indicates practically the same position of the upper lip in both groupings. Angle I, which relates the lower lip to cranium, averages 92.9 degrees in the normal group and 92.6 degrees in the Class II, Division 1 group, which points to a very close approximation of these soft-tissue reference points. Another finding was the close relationship of angle INPg, which relates lower lip to pogonion, in the normal, the Class II, Division 2, and the Class III groupings. They measure 4.8, 4.9, and 4.2 degrees, respectively.

TABLE IV. SOFT-TISSUE PROFILE ANALYSIS USED ON CLASS III MALOCCLUSIONS

Age:			*Sex:*	
Mean 17.4 years			Males	7
Range 7 to 28 years			Females	6
Race: Caucasian			Total	13

ANGLE	RANGE (DEGREES)	MEAN (DEGREES)	STANDARD DEVIATION (DEGREES)	STANDARD ERROR OF MEAN (DEGREES)
S	88.0 to 99.0	95.4	3.1	0.87
I	89.5 to 99.0	95.0	3.9	1.08
Pg	82.0 to 100.0	90.8	5.3	1.48
SNI	-4.0 to +3.5	+0.4	2.4	0.66
INPg	-1.0 to +8.0	+4.2	2.1	0.58
SNPg	-4.0 to +9.0	+4.6	2.6	0.73

These findings will tend to substantiate the statement of Wylie[10]:

> Among the students of craniofacial morphology, many of whom are orthodontists, there is a growing conviction that there is no such single entity as a "normal" facial pattern, and that dentofacial anomalies are in a large measure occasioned by a random combination of facial parts, no one of which is abnormal in size when taken by itself, but each one of which may fit badly with the other parts to produce a condition which may be called dysplasia.

DISCUSSION OF THE FINDINGS IN RELATION TO TREATMENT OBJECTIVES

In the practice of our art, one must always be aware of the fact that we are treating human beings with very complex make-ups, with great variability, individual differences, and limitations. These are based on genetic and developmental factors which cannot be entirely controlled or corrected. The idea that it is possible to mold a facial profile to a preconceived ideal, as a sculptor does with clay, is without scientific foundation. Too often, when we gaze upon a group of carefully selected, beautiful, well-balanced straight profiles with excellent occlusions, a mental image is formed and one may try to re-create this concept of beauty on his patient. In the analysis conducted on persons with excellent occlusions, however, many were found with deficient chins. This strongly indicates that there is not necessarily a positive correlation between excellent occlusion and the ideal, straight profile.

It is particularly important, when making an initial examination of Class II cases, to examine the facial profile on the oriented photograph and to note whether or not there is a marked deficiency in the chin area. It has been noted

Fig. 11. Fig. 12.

Fig. 11.—Class II, Division 2 malocclusion. Profile angles: *S*, 97 degrees; *I*, 89 degrees; *Pg*, 84 degrees; *SNI*, 8 degrees; *INPg*, 5 degrees; *SNPg*, 13 degrees.

Fig. 12.—Class III malocclusion. Profile angles: *S*, 95 degrees; *I*, 97 degrees; *Pg*, 92 degrees; *SNI*, −2 degrees; *INPg*, 5 degrees; *SNPg*, 3 degrees.

Fig. 13. Fig. 14.

Fig. 13.—Class II, Division 1 case before treatment. Profile angles: *S*, 97 degrees; *I*, 90 degrees; *Pg*, 82 degrees; *SNI*, 7 degrees; *INPg*, 8 degrees; *SNPg*, 15 degrees.

Fig. 14.—Class II, Division 1 case after treatment. Profile angles: *S*, 94 degrees; *I*, 87 degrees; *Pg*, 82 degrees; *SNI*, 7 degrees; *INPg*, 5 degrees; *SNPg*, 12 degrees.

that in some Class II cases involving retruded mandibles, even though the occlusion has been corrected, there is no measurable improvement in the chin area. If a marked dysplasia is recognized and explained to the patient at the start of treatment, he will have a realistic concept of the possibilities of improving his facial profile. This revelation should not disturb the patient, since certainly other benefits, such as correction of abnormal jaw relations, deep overbite, and lip posture, can be gained from treatment.

PRETREATMENT AND POSTTREATMENT FINDINGS

Figs. 13 and 14 demonstrate the changes which occurred in treatment of a Class II, Division 1 malocclusion. It appears that the maximum change in this case occurred in relating the lower lip to pogonion or the INPg angle as well as angle SNPg.

Fig. 15.

Fig. 16.

Fig. 15.—Class II, Division 1 case before treatment. Profile angles: *S*, 97 degrees; *I*, 87 degrees; *Pg*, 80 degrees; *SNI*, 10 degrees; *INPg*, 7 degrees; *SNPg*, 17 degrees.

Fig. 16.—Class II, Division 1 case after treatment. Profile angles: *S*, 97 degrees; *I*, 91 degrees; *Pg*, 86 degrees; *SNI*, 6 degrees; *INPg*, 5 degrees; *SNPg*, 11 degrees.

Figs. 15 and 16 also show changes which resulted from treatment of another severe Class II, Division 1 case. Although the pretreatment photograph shows an unfavorable facial pattern and a poor prognosis, the posttreatment photograph shows a remarkable facial improvement.

Another observation made in the study of treated cases through the soft-tissue profile analysis was that in certain instances in which the dentition was corrected to a marked degree, the net profile change was rather slight. This again stresses the need for evaluating the soft-tissue profile as a separate entity, apart from the dentoskeletal analysis.

SUMMARY

In this study a method is introduced for the purpose of evaluating the soft-tissue profile in a quantitative manner on a profile photograph or cephalometric radiograph.

Six profile angles are selected as being particularly significant in analyzing the soft-tissue profile. Angular relationships are established between upper lip, lower lip, and chin.

This method was employed in examining one group of persons with normal, excellent occlusions and acceptable facial form and other groups with malocclusions. Measurements were made from photographs and were evaluated statistically.

Information gained from the study of clinically excellent occlusions indicates that the straight profile does not necessarily accompany normal occlusion. This finding may be explained by the great variability which exists in the cross section of our population.

The limitations of orthodontic treatment in correcting facial deformities are stressed. Special attention is called to the need for recognizing marked deficiencies in the pogonion area in the correction of malocclusions.

This study indicates that a proportionate change or improvement of the soft-tissue profile does not necessarily accompany extensive dentition changes, and that, therefore, one can no longer rely entirely on a dentoskeletal analysis for accurate information on the soft-tissue facial profile changes which have occurred during orthodontic treatment.

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MEDICAL TOWER.

ASSESSMENT OF MALOCCLUSION IN POPULATION GROUPS*

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INTRODUCTION

DETERMINATION of inciting factors and their role in the distribution and frequency of malaligned teeth and improper jaw relationships has been seriously hampered by the lack of objective criteria for establishing norms, describing prevailing situations, and assessing group differences.

In the past, dental surveys of population groups have emphasized facts that reflect the impact of caries on dental health status. Counts of decayed, filled, and missing teeth, expressed as DMF rates, have proved to be objective devices for assessing the caries problem and evaluating the progress of preventive and restorative programs. The DMF survey provides a rapid and reliable method for acquiring these useful data.

Recently, a survey method for periodontal disease has been developed.[1] The procedure involves scoring, on a progressive scale, the condition of the investing tissues of each tooth. The findings are expressed as an index based upon an average of scores for the individual teeth. When conducted in conjunction with a DMF assessment, this added feature greatly broadens the scope of the examination and causes little added discomfort or inconvenience to the person examined.

This paper is a progress report of preliminary work in the development of an examination procedure for malocclusion. The procedure gives promise of extending further the scope and usefulness of information collected.

Because of the nature of malocclusion, there are many limitations that affect the objectives of any assessment method that may be adopted. Malocclusion is not a single entity but rather a collection of situations, each in itself constituting a problem. Many of the situations are complicated by a multiplicity of causes and are reversible through growth and development, or through tooth loss and treatment. In the work carried out so far, it has been assumed that the primary purpose of an assessment of malocclusion is to provide data useful for group study, even though the index may not be sufficiently sensitive for selecting cases for treatment.

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While a screening procedure may evolve as a valuable outgrowth of the assessment, this feature has been considered as secondary to group comparisons. Emphasis was placed upon the development of an objective examination method to assure that differences, once found, would reflect true group differences. The procedure has been kept simple to assure its rapid applicability in field programs. It is designed to provide index values which should not only quantify the level of malocclusion in individual mouths but should also rank the build-up of problems in population groups. This would permit both a comparison between groups examined and an assessment of changes associated with preventive or corrective programs.

The assessment method differs from that followed in a routine clinical examination by an orthodontist or other dentist. Neither a conventional dental chair nor an examination light is used, although an adequate fixed source of light is essential. A small plastic, gaugelike tool especially designed for the work is the only instrument used in making the necessary measurements for assessment (Fig. 1).

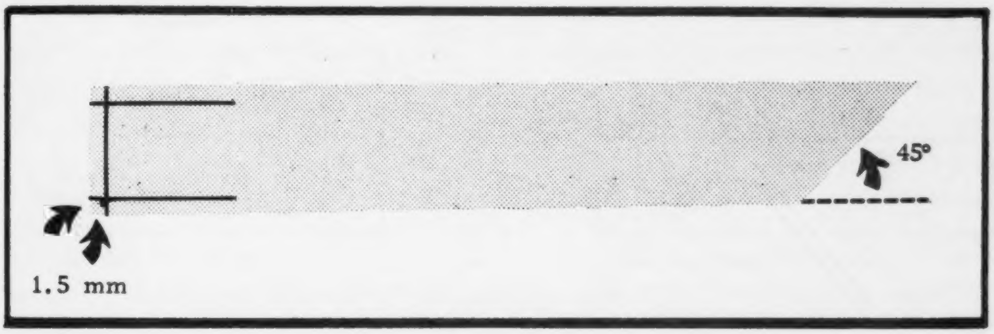

Fig. 1.—Schematic drawing of instrument used for measurement. The clear plastic rulerlike instrument, measuring 1 inch × 4 inches, has a 45 degree angle cut at one end and lines etched 1.5 mm. from the edges of the other end.

Malalignment of teeth was selected for measurement because of the frequency of its occurrence and its high degree of association with other situations which are most commonly represented in the total malocclusion complex. Scoring of individual tooth findings is summated for the anterior and right and left posterior segments of each arch. A final malalignment index is obtained as the total of the six segment scores.

EXAMINATION AND SCORING PROCEDURE

The segments are assessed in the following order: maxillary anterior, maxillary right posterior, maxillary left posterior, mandibular anterior, mandibular right posterior, and mandibular left posterior. Each tooth present in a segment is scored 0, 1 or 2.

A score of 0 represents ideal alignment. Here the tooth shows no apparent deviation from the ideal arch line as projected through the contact areas (Fig. 2).

Score 1 represents minor malalignment of two types. The first is *rotation*. Here the angle formed by the line projected through the contact areas of observed tooth and the ideal arch line is less than 45 degrees. The second is *displacement*. In this situation, both contact areas of the tooth are removed in the same direction from their position in ideal alignment but less than 1.5 mm. removed (Fig. 2).

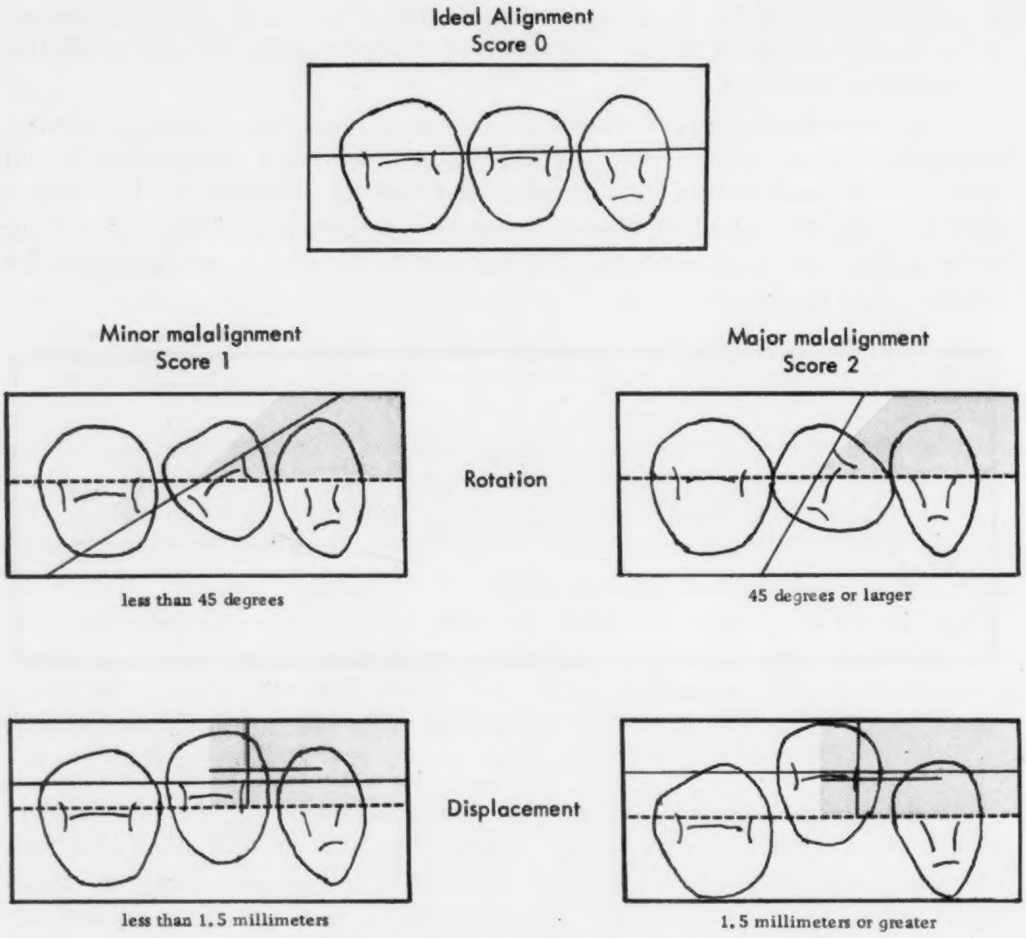

Fig. 2.—Schematic diagram of malalignment scoring procedure.

Score 2 covers major malalignments of *rotation* and *displacement*. *Major rotation* is present when the angle formed by the line projected through the contact areas of the observed tooth and the ideal arch line is 45 degrees or larger. *Major displacement* occurs when both contact areas of the tooth are removed from their position in ideal alignment by 1.5 mm. or more (Fig. 2).

The plastic instrument is superimposed over the teeth for the scoring measurements. As the examination is completed for each segment, the values are summated to give a score for that segment. The *final malalignment* index is obtained as the sum of the scores recorded for all six segments. Experience

to date indicates that one minute or less is required for the entire procedure. The range of values may extend from 0 to 64 in mouths with thirty-two teeth present. However, in practice, few mouths score 0 or above 18.

The procedure outlined for assessing teeth for the malalignment index was followed in examinations of 2,100 junior high school children from suburban areas adjacent to Washington, D. C. With but few exceptions, the children were between 12 and 15 years of age; their average age was 13.9 years.

TABLE I. PER CENT DISTRIBUTION OF GROUPED MALALIGNMENT SCORES BY AGE FOR 2,100 JUNIOR HIGH SCHOOL STUDENTS

AGE	NUMBER EXAMINED	AVERAGE MALALIGNMENT SCORES	RANGE OF MALALIGNMENT SCORES				
			ALL	0-5	6-7	8-9	10 AND GREATER
All	2,100	7.5	100.0	28.3	26.8	21.5	23.4
Under 12 years	16	6.7	100.0	37.5	25.0	25.0	12.5
12 years	473	6.9	100.0	34.9	29.2	19.0	16.9
13 years	620	7.4	100.0	31.2	25.2	22.3	21.3
14 years	719	7.6	100.0	25.2	25.1	24.4	25.3
15 years	237	8.3	100.0	19.4	29.1	16.5	35.0
16 years and older	35	8.6	100.0	8.6	42.8	17.1	31.5

The group was characterized by an average malalignment score of 7.5, and the values scored ranged from 0 to 21. Of the 2,100 children examined, however, only five were scored 0, and scores in excess of 18 were recorded for only seven. More than a fourth of the children (28.3 per cent) had scores between 0 and 5 (Table I). A similar proportion (26.8 per cent) were scored 6 or 7. On the other hand, slightly more than a fifth (21.5 per cent) had scores of 8 or 9, and nearly a fourth (23.4 per cent) of the children had index values of 10 or more.

TABLE II. AVERAGE MALALIGNMENT SCORES AND AVERAGE SEGMENT SCORE BY AGE FOR 2,100 JUNIOR HIGH SCHOOL STUDENTS

AGE	NUMBER EXAMINED	AVERAGE MALALIGNMENT SCORES				
		TOTAL SCORE	MAXILLARY ANTERIOR	MANDIBULAR ANTERIOR	MAXILLARY POSTERIOR	MANDIBULAR POSTERIOR
All	2,100	7.5	2.0	2.2	1.5	1.8
Under 12 years	16	6.7	2.1	2.5	1.2	0.9
12 years	473	6.9	1.9	2.2	1.3	1.5
13 years	620	7.4	2.0	2.2	1.5	1.7
14 years	719	7.6	1.9	2.1	1.6	2.0
15 years	237	8.3	2.1	2.3	1.7	2.2
16 years and older	35	8.6	2.0	2.3	2.0	2.3

The contribution of the segment scores to the total malalignment index built up to somewhat greater levels in anterior than in posterior teeth for both arches (Table II). Similarly, for both anterior and posterior teeth, the scores were greater in the mandible than in the maxilla. The scores for the four areas were as follows: mandibular anterior, 2.2; maxillary anterior 2.0; mandibular posterior, 1.8; and maxillary posterior, 1.5.

The level reflected by average malalignment scores built up in an orderly fashion as age increased (Table I). The average for 12-year-old children was 6.9. For those who were 15 years old, it was 8.3. Coincidental with this change

in average scores was a progressive upward shift in the distribution of scores for individual children. More than a third of the 12-year-old group were scored with values between 0 and 5, while one in six had malalignment scores of 10 or more. In contrast, only one 15-year-old in five had scores between 0 and 5, and more than one-third were rated 10 or more on the scale of values.

The average score for each segment also showed a progressively higher value as the total malalignment score increased (Table II). Proportionately, the posterior segments of both arches contributed more than anterior segments to the increase. Between the ages of 12 and 15 years, average scores for anterior teeth increased from 1.9 to 2.1 in the maxilla and from 2.2 to 2.3 in the mandible. Corresponding changes in posterior teeth resulted in expansion from 1.3 to 1.7 in the maxilla and from 1.5 to 2.2 in the mandible. In other words, the scores for anterior segments expanded by less than one-tenth, in contrast with increases of about one-third for posterior teeth in both arches.

There was little evidence to suggest any difference between boys and girls in the distribution of segment scores. Nor was there any difference in the manner in which the total malalignment index increased with advance in age.

In the course of the preliminary work leading to the development of the malalignment index, dental examinations were completed on each of more than 300 teen-age boys in a special study group. For the most part, these boys were 15, 16, or 17 years of age. Their average age was 16.6 years. The average malalignment index for the group was 7.6, not far different from that found for the younger junior high students. The distribution of their individual scores was also similar, except that somewhat greater proportions were concentrated in the 0 to 5 (33.2 versus 28.3 per cent) and the 10 and over categories (27.7 versus 23.4 per cent). Correspondingly fewer scores were found in the 6 to 9 range (39.1 versus 48.3 per cent).

PER CENT DISTRIBUTION OF GROUPED MALALIGNMENT SCORES OF 307 TEEN-AGE BOYS

NUMBER EXAMINED	AVERAGE MALALIGNMENT SCORE	RANGE OF MALALIGNMENT SCORES			
		ALL	0-5	6-9	10 AND GREATER
307	7.6	100.0	33.2	39.1	27.7

As a preliminary assessment of the malalignment index as a measure of severity of malocclusion, a selected small sample of 152 boys was drawn from the teen-age group. Concurrent appraisals by the index and by a clinical evaluation of an experienced orthodontist were performed. To minimize the effect of gross neglect and tooth loss upon the appraisal, the sample, by and large, was composed of boys with full complements of anterior teeth and with somewhat better dental conditions than most of the group.

PER CENT DISTRIBUTION OF GROUPED MALALIGNMENT SCORES FOR 152 TEEN-AGE BOYS

NUMBER EXAMINED	AVERAGE MALALIGNMENT SCORE	RANGE OF MALALIGNMENT SCORES			
		ALL	0-5	6-9	10 AND GREATER
152	6.9	100.0	35.5	42.8	21.7

The average malalignment score for this sample of boys was 6.9, slightly below that for all boys in the teen-age group. The proportion with scores between 0 and 5 rose to 35.5 per cent; the proportion between 6 and 9 to 42.8 per cent. The proportion with scores of 10 or more was 21.7 per cent. The clinical appraisal by the orthodontist rated 15.8 per cent with slight, 37.5 per cent with mild, and 46.7 per cent with moderate or severe malocclusion (Table III).

TABLE III. PER CENT DISTRIBUTION OF GROUPED TOTAL MALALIGNMENT SCORES BY ORTHODONTIC RATING OF MALOCCLUSION FOR 152 TEEN-AGE BOYS

RANGE OF MALALIGNMENT SCORES	NUMBER EXAMINED	ORTHODONTIC RATING			
		ALL	SLIGHT	MILD	MODERATE OR SEVERE
All	152	100.0	15.8	37.5	46.7
0-5	55	100.0	32.7	43.6	23.7
6-9	65	100.0	9.2	41.5	49.3
10 and greater	32	100.0	0	18.8	81.2

The association between malalignment scores and the orthodontist's appraisals, even though based upon a small sample, is very striking (Table III). Of the fifty-five boys with index score of 5 or less, 32.7 per cent were classified with slight, 43.6 per cent with mild, and 23.7 per cent with moderate or severe malocclusions. The sixty-five boys with scores between 6 and 9 included only 9.2 per cent with slight, 41.5 per cent with mild, and 49.3 per cent (or nearly one-half) with moderate or severe malocclusion. Finally, among the thirty-two boys with malalignment scores of 10 or more, the orthodontist found no case that he could classify as slight. He rated only 18.8 per cent with mild malocclusion but found 81.2 per cent with moderate or severe malocclusion.

A project carried out to test agreement in the findings of two examiners in their application of a dental screening examination of broad scope, offered an opportunity to compare malalignment index values for paired observations. The sample, while limited to sixty-seven boys from the teen-age group, included members who were especially selected to reveal poor oral hygiene and periodontal disease.

The impact of adverse selection in the subsample used is reflected in the high malalignment index values which averaged 10.8. This is divergent from the average of 7.6 found in all the teen-age groups and the 6.9 for the subsample used in the orthodontic appraisal. For this group only 3.7 per cent were scored between 0 and 5, 40.3 per cent between 6 and 9, and 56.0 per cent 10 or more.

PER CENT DISTRIBUTION OF GROUPED MALALIGNMENT SCORES FOR 67 TEEN-AGE BOYS

EXAMINER	NUMBER OF EXAMINATIONS	AVERAGE MALALIGNMENT SCORE	RANGE OF MALALIGNMENT SCORES			
			ALL	0-5	6-9	10 AND GREATER
Average*	134	10.8	100.0	3.7	40.3	56.0
A	67	10.6	100.0	3.0	44.8	52.2
B	67	11.1	100.0	4.5	35.8	59.7

*Average of examinations performed by two dentists on sixty-seven boys.

Analysis of the malalignment scores recorded in the two sets of examinations showed no large divergence. The average index values were 10.6 and 11.1.

SUMMARY

An objective method for assessing malocclusion in population groups has been presented. The examination provides for scoring the departure of each tooth from its ideal position in the arch and the summing-up of these scores for a malalignment index. The examination procedure is both rapid and simple in its application. In its preliminary use as an epidemiologic survey tool, the malalignment index has demonstrated a progressive increase in average scores from the ages of 12 to 15 years. The increase is three times as great in the posterior as in the anterior areas of the jaws. In the age groups studied the largest contribution to the total score is made by the mandibular anterior segment, but as age increases the differences become progressively less apparent.

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EFFECTIVENESS OF THE ORAL SCREEN IN THE TREATMENT OF UPPER INCISOR PROTRUSIONS

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INTRODUCTION

THE interception and correction of malocclusions in children have become a major objective in both orthodontics and pedodontics.[1, 2] One of the most obvious types of malocclusion, and one which is most often referred for treatment, is characterized by a protrusion of the upper incisors.

Upper anterior protrusions may be associated with a distocclusion of the molar teeth (Class II, Division 1) or with a normal occlusion of the molar teeth but crowding of other teeth, usually the lower incisors (Class I).[3] Protrusions generally are the result of local forces acting on these teeth in a labial direction. These forces include prolonged thumb-sucking, lip-sucking, tongue-sucking, mouth-breathing, and many types of muscular perversions and pressure habits, such as tongue-thrusting, leaning on fists, or sleeping on arms or hands.[3]

"The teeth, once they emerge from their bony crypts, are completely at the mercy of their muscular environment so far as their buccolingual and labiolingual positions are concerned. Their arrangement will be determined by the equilibrium between the tongue on the inside and the lips and cheeks without."[4] The re-establishment of normal muscular function is therefore paramount to a stabilized occlusion. Corrective appliances and interceptive devices which eliminate the habit and restore normal muscle balances while correcting the malocclusion are therefore most useful in this connection.

THE ORAL SCREEN

The oral screen is an easily constructed myofunctional appliance which has been used for the correction of upper anterior protrusions resulting from prolonged mouth-breathing[5, 6] (Fig. 1). It has also proved useful in the interception and correction of maxillary incisor protrusions caused by thumb-sucking, lip-sucking, tongue-sucking, and tongue-thrusting, and by an infantile, flaccid oral sphincter[7] (Fig. 2). It is essentially a thin shield, usually

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made of a plastic material, which is inserted into the anterior vestibule. The appliance may be passive to prevent mouth-breathing only, or it may be made active to cause a retrusion of protruded upper incisors. In the active appliance the oral screen rests upon the maxillary incisors. The labial musculature exerts pressure upon the shield, and this force is transmitted to the teeth to drive them palatally into correct position.[3, 7]

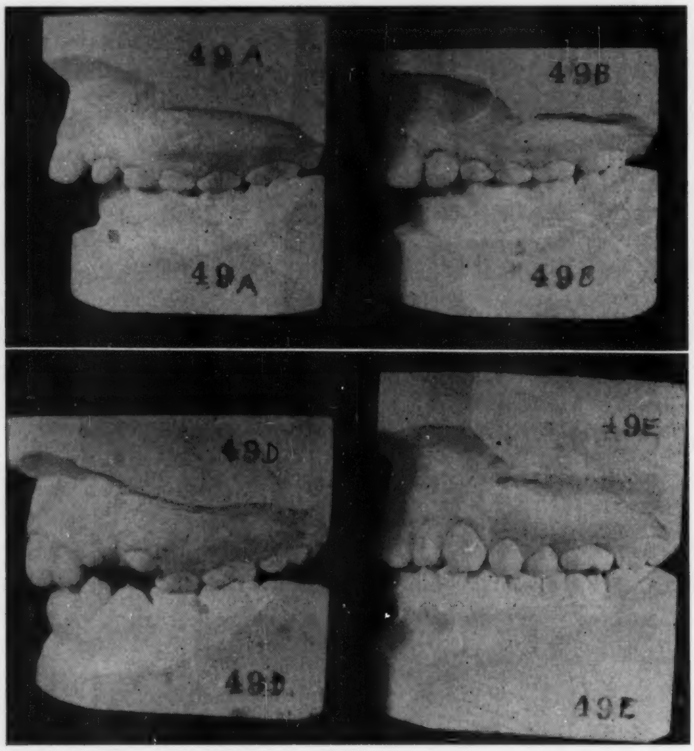

Fig. 1.—Case 49, a 9-year-old girl with history of mouth-breathing. *A*, Models taken at beginning of treatment. *B*, After wearing an oral screen at night only for one year. *D*, Two years later (age 12) after wearing the oral screen intermittently. *E*, One year after oral screen was discontinued (age 13).

The oral screen is most effective during the mixed dentition and young permanent dentition periods but may be used at any age, being limited only by the patient's ability to cooperate and to retain the appliance in his mouth during sleep. The child patient is instructed to wear the oral screen every night unless a cold or some other condition makes nasal breathing difficult. The patient's ability to breathe normally may be tested by holding a wisp of cotton alternately under each nostril as the patient breathes. Movement or lack of movement of the cotton will determine the degree of air flow.

Nocturnal sucking habits are also effectively discouraged by this device. Myofunctional exercises may be prescribed during the daytime to supplement the action of the oral screen during the night.[7]

The patient returns at monthly intervals for adjustment and observation. The oral screen may be adjusted by heating the plastic and bending it as

desired. Plastic may also be added to those areas in contact with the teeth as needed during treatment.

This study was undertaken to determine the effectiveness of the oral screen when used to correct various types of maxillary incisor protrusions. So far as we know, no assessment to determine the effectiveness of the oral screen as a pedodontic or orthodontic device has been reported.

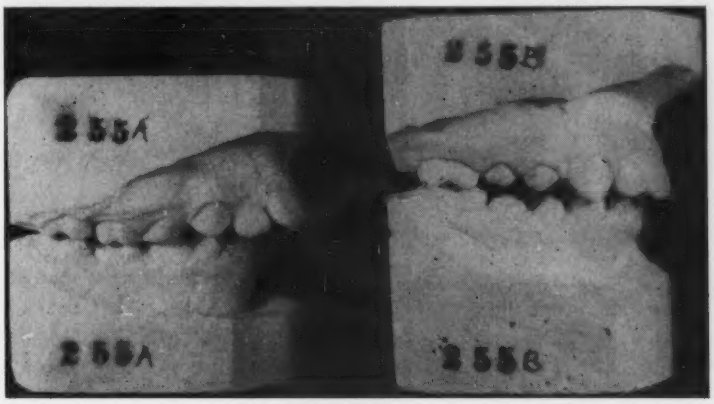

Fig. 2.—Case 255, an 8-year-old patient with persistent tongue-thrust when swallowing and talking and a potential Class II, Division 1 malocclusion. *A*, Models at beginning of treatment. *B*, After wearing oral screen for one year.

MATERIALS

One hundred forty-six children, ranging in age from 7 to 15 years, were treated by the senior author (A.K.T.) in his private orthodontic practice. All had some degree of maxillary incisor protrusion associated with various habits or muscular perversions. No conscious attempt was made to select cases which might be more amenable to this type of treatment. Other defects of occlusion, such as crowded anterior teeth or abnormal molar relationships, were ignored. All cases with upper incisor protrusions presenting from 1952 to 1956 were treated without selection, since one of the secondary purposes of this study was to determine the limitations and potentials of this type of treatment. In some cases, supplementary treatment with other devices was necessary to achieve correction. These are noted in the assessment.

Construction of the oral screen was essentially the same as that described by Massler.[7]

ANALYSIS OF DATA

Analysis of the results of treatment with the oral screen was accomplished in two steps. The senior author (A.K.T.) first reviewed and tabulated the results in each case by inspection of models taken before, during, and after treatment. Each set of models was then photographed. These photographs together with a brief history of each case were then sent to the two coauthors (M.M. and W.A.B.B.), who made an independent analysis of each case.

Each set of models was photographed so that the occlusion could be viewed from each side and from the front in occlusion and from the occlusal aspect to show the mandibular and maxillary arch forms. Assessment was made of changes in spacing of the maxillary incisors, the reduction of overjet, and changes in arch form.

Criteria Used.—Treatment was judged to be "successful" only if all the teeth were in normal and ideal occlusion.

Cases were assessed as showing "marked improvement" when the upper incisors appeared to have normal overjet and overbite but the canine, premolar, or molar teeth did not present ideal intercuspation. It was in these patients that additional therapy was thought to be necessary.

Cases were assessed as showing "moderate improvement" when the incisors showed a reduction in overjet and alignment to almost normal but improvement of the buccal segment relationship was still necessary.

Cases were assessed as showing "slight improvement" when the incisor overjet was reduced by treatment but the alignment of the anterior segment could not be considered acceptable.

FINDINGS

Table I, *A* presents the analysis of the 146 cases made by the operator (A.K.T.), and Table I, *B* presents the analysis made by W.A.B.B. and M.M. from the photographs only. The agreement was good in all but nine of the individual cases.

Table I. Evaluation of 146 Children With Protrusion of Maxillary Incisors Treated With the Oral Screen

Incisor protrusion	Normal molar relation		Molars Class II		All cases	
	No.	Per cent	No.	Per cent	No.	Per cent
A. Analysis From Models by Operator (A.K.T.)						
Marked improvement	20	48	44	42	64	44
Slight to moderate improvement	16	38	48	46	64	44
No improvement	6	14	12	12	18	12
Totals	42	100	104	100	146	100
B. Analysis by W.A.B.B. and M.M. From Photographs of Models						
Marked improvement	22	53	44	42	66	45
Slight to moderate improvement	17	40	36	35	53	36
No improvement	3	7	24	23	27	19
Totals	42	100	104	100	146	100

The operator found that 128 cases had improved to various degrees from marked to moderate and that only eighteen cases (12 per cent) had shown no improvement. His critics found 119 cases improved and twenty-seven cases (19 per cent) not improved. Of the latter, they felt that eighteen cases were not suitable for this form of therapy and had become worse because of maxillary incisor crowding (see Table II for details).

These results are in close agreement in view of the fact that one analysis was made by the operator himself and was therefore open to some subjectivity

while the others derived their data from photographs alone. Differences in opinion were evident in only nine of the 146 cases, and these were fundamentally based on the factor of incisor crowding. Incisor crowding was felt by W.A.B.B. and M.M. to be a contraindication to the use of the oral screen. However, this was *not* used as a basis of selection at the beginning of the study by A.K.T.

General Effectiveness of the Oral Screen.—Table II (column 4) shows that the oral screen, *used alone,* was very successful in correcting incisor protrusion in this age group (Figs. 1 and 2). Eighteen per cent showed completely satisfactory occlusion in both anterior and posterior segments after treatment, while 27.5 per cent showed complete correction of the anterior protrusion but no improvement in the molar relationship or crowding of the lower incisors. This means that 45.5 per cent of the unselected cases were completely and successfully treated in so far as the anterior occlusion was concerned which, in fact, was the intended purpose of the appliance in the first place. An additional 27.5 per cent showed moderate improvement in the anterior protrusion, but not complete correction.

TABLE II. EVALUATION OF EFFECT OF ORAL SCREEN ON INCISOR PROTRUSION IN DIFFERENT TYPES OF MALOCCLUSION

INCISOR ALIGNMENT	MOLARS NORMAL	MOLARS CLASS II*	ALL CASES
(1) Complete correction†	16 (38%)	10 (9.5%)	26 (18.0%)
(2) Marked improvement‡	6 (15%)	34 (33.0%)	40 (27.5%)
(3) Moderate improvement§	14 (33%)	26 (25.0%)	40 (27.5%)
(3) Slight improvement§	3 (7%)	10 (9.5%)	13 (9.0%)
No change	2 (5%)	7 (6.5%)	9 (6.0%)
Worsened	1 (2%)	17 (16.5%)	18 (12.0%)
Totals	42 (100%)	104 (100.0%)	146 (100.0%)

*Unilateral and bilateral Class II molar relations, combined. There were no significant differences apparent when each group was examined separately.

†Required no other therapy for complete correction of occlusion.

‡Upper anterior protrusion corrected but other teeth not in correct occlusion.

§Upper anterior protrusion improved but not wholly corrected.

Forty cases in (2) and (3) required additional treatment with other appliances for full correction.

Twenty-seven per cent failed to show satisfactory improvement. Nine per cent showed only a slight decrease in protrusion, and 6 per cent showed no change. Twelve per cent became worse. In the opinion of W.A.B.B. and M.M., eighteen of the 146 cases (12 per cent) were not suited for treatment by the oral screen primarily because of crowding in the upper anterior teeth (Fig. 3).

Results in Class I and Class II, Division 1 Malocclusions.—Table II also shows that there was a decided difference in the success of treatment when the patient presented with a normal or Class II molar relation (compare columns 2 and 3). When the molar relation was correct at the beginning of treatment, correction of the anterior protrusion with the oral screen was judged to be all that was necessary in 38 per cent of the cases. An additional 15 per cent showed complete correction of the upper anterior protrusion, but crowding of the lower incisors was not corrected. In other words, in the

forty-two children with anterior protrusions and good molar relations, treatment was completed or almost completed in 53 per cent by the use of the oral screen alone. An additional 33 per cent showed improvement in the maxillary protrusion but were not completely corrected. This device was judged inadequate in only 15 per cent of this group.

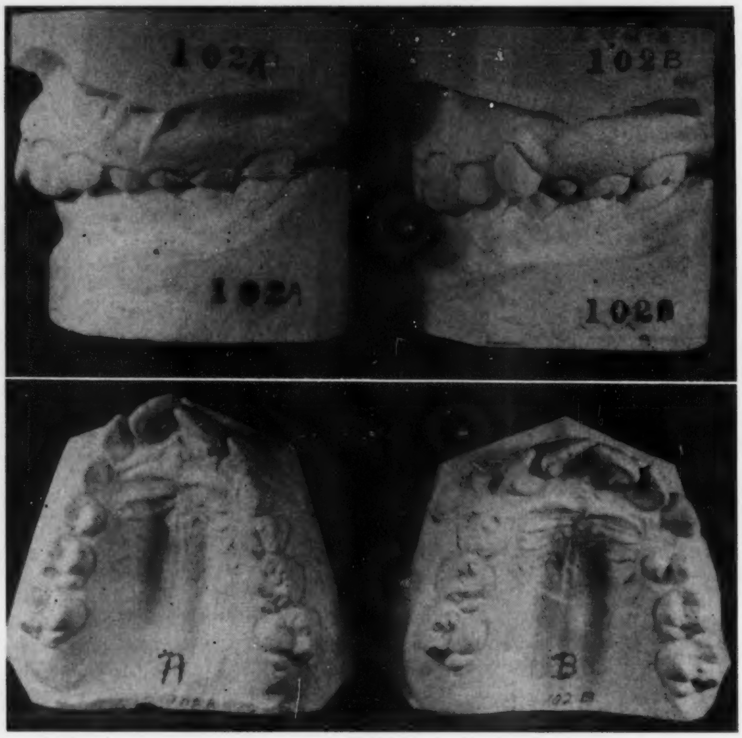

Fig. 3.—Case 102. Models showing example of case not suited for oral screen therapy because of severe crowding of upper and lower anterior teeth. *A*, Models taken at beginning of treatment. *B*, After wearing the oral screen at night for approximately one and one half years.

In the group of 104 children with upper anterior protrusion and poor molar relations, the upper anterior protrusion was corrected or markedly improved in 42.5 per cent. Surprisingly, 9.5 per cent showed also a correction of the molar relation. This cannot be ascribed to the action of the oral screen and probably represents a "spontaneous" correction or self-correction in molar relation after shedding of the deciduous premolars. Sixteen per cent showed little or no improvement, and 16.5 per cent were judged to be unsuited for treatment with the oral screen because of incisor crowding and lack of space. In fact, alignment of the maxillary incisors became worse after treatment. Nonetheless, correction of anterior protrusion in 42.5 per cent of Class II malocclusions represents a significant accomplishment by a very simple device. It was quite evident, however, that this correction was limited wholly to the upper anterior segment, that it was more successful when spacing was present, and that a satisfactory reduction in protrusion (complete or almost complete) could be expected in only 40 to 50 per cent of the cases treated. The remainder would require additional treatments.

There was little doubt that the percentage of "successful" cases and those with "marked improvement" could have been increased considerably by more careful selection. This study, it will be recalled, did not attempt any selection.

TABLE III. EFFECTS OF ORAL SCREEN WHEN INCISOR SPACING WAS PRESENT OR ABSENT

INCISOR ALIGNMENT	SPACED BEFORE TREATMENT	NOT SPACED BEFORE TREATMENT	ALL CASES
Completely restored	17 (19%)	9 (17%)	26 (18%)
Improved	68 (74%)	25 (46%)	93 (64%)
No change	5 (4%)	4 (7%)	9 (6%)
Worsened	2 (1%)	16 (30%)	18 (12%)
Total number of cases	92 (98%)	54 (100%)	146 (100%)

Spacing of Incisors Before Treatment.—Table III shows that incisor alignment could be completely restored or improved by the oral screen, whether spacing was or was not present before treatment. However, the percentage was higher when spacing was present (93 per cent versus 67 per cent). Perhaps more important was the fact that incisor alignment was made worse in only 1 per cent of the cases with spacing, while 30 per cent became worse when spacing was absent before treatment.

Effect of Age of Patient.—Table IV shows that the age of the patient made no difference in the results obtained with the oral screen.

TABLE IV. RELATION OF AGE TO RESULTS OBTAINED BY USE OF ORAL SCREEN (ANALYSIS FROM MODELS BY OPERATOR)

INCISOR PROTRUSION	7-10 YEARS			11-15 YEARS		
	MOLARS			MOLARS		
	NORMAL	CLASS II	ALL CASES	NORMAL	CLASS II	ALL CASES
Marked improvement	9	30	39 (44.5%)	10	15	25 (43.0%)
Slight to moderate improvement	9	30	39 (44.5%)	7	18	25 (43.0%)
No improvement	3	7	10 (11.0%)	3	5	8 (14.0%)
Totals	21	67	88 (100.0%)	20	38	58 (100.0%)

Effect in Finger-Suckers.—Teeth are moved by the oral screen because of the pressure applied to it from the musculature. At the same time, the adverse influence of fingers and lips is largely or altogether removed. Thirty-eight (88.5 per cent) of the forty-three patients who had a history of finger-sucking showed a marked improvement in incisor alignment; of these, seven (20 per cent) had their occlusion completely restored to normal (Table V).

TABLE V. EFFECTS OF ORAL SCREEN IN FORTY-THREE CHILDREN WITH UPPER ANTERIOR PROTRUSION AND HISTORY OF FINGER-SUCKING

Maxillary Incisor Alignment	
Improved	38 (88.5%)*
No change	2 (7.0%)
Worsened	3 (11.5%)
Total number sucking fingers	43 (100.0%)

*In seven of the thirty-eight cases (20 per cent), the occlusion was considered corrected and the cases were completed by use of the oral screen only.

Role of Cooperation.—The cooperation of these patients was assessed in relation to the results obtained. Although we recognize that it is difficult to measure cooperation except perhaps by counting the hours during which the plate is worn, the operator assessed cooperation from statements from his patients. As would be expected, most of the successfully completed and improved cases were among those patients who cooperated well. However, no less than five of the forty-one children who showed poor cooperation were considered to be successfully treated and nine more showed marked improvement (Table VI). Fourteen per cent of the 101 children who showed good cooperation showed no improvement at all, but eleven of these were among those cases in which oral screen therapy was ill advised.

TABLE VI. RELATIONSHIP OF COOPERATION TO EFFECTIVENESS OF ORAL SCREEN

RESULT OF TREATMENT	GOOD COOPERATION	POOR COOPERATION	ALL CASES
Successful completion	21 (20%)	5 (12%)	26 (18%)
Marked improvement	29 (29%)	9 (22%)	38 (27%)
Slight to moderate improvement	37 (37%)	16 (39%)	53 (37%)
No improvement	14 (14%)	11 (27%)	25 (18%)
Totals	101 (100%)	41 (100%)	142* (100%)

*Four cases were indeterminate, showing neither good nor poor cooperation.

DISCUSSION

The oral screen is a functional appliance that has considerable merit in the correction of maxillary incisor protrusions caused by local environmental factors (habits). This appliance is most effective during the mixed dentition period when it is sometimes difficult to use fixed appliances. It is most effective in influencing cases in which there is spacing between the incisors; eighty-five of the 119 cases which improved fell within this category. Furthermore, the oral screen produces markedly better results in cases with Class I molar relations than in those with Class II molar relations. These two facts should be borne in mind when cases are selected for treatment.

Six cases were successfully treated even when cooperation of the patient was doubtful. This should point to the large role which growth plays in the correction of malocclusions. Lundergan[2] showed that the number of cases with posteroclusion per 1,000 children declined from 119 to seventy-six from the age of 14 to the age of 15 years.

It is quite clear that while the oral screen produced only a relatively small number of complete corrections, a large percentage were markedly or moderately improved. These were subsequently completed with other appliances. It should be realized that the oral screen was used at a time when fixed-appliance therapy is usually contraindicated. Thus, this appliance fills a real need during the mixed dentition period.

The oral screen probably promotes and develops normal tongue and lip function. It certainly aids in re-establishing nasal breathing in the habitual mouth-breather. The mouth-breathing habit in many cases may continue after adenoidal tissue or other obstructions are removed.[5, 6] Sucking habits

are also discouraged. Since the oral screen is worn only at night, the force is not continuous as with fixed appliances. The force on the teeth is determined by the functional force of the labial and buccal musculature. Tooth movement is therefore effected with little or no trauma to the periodontal tissues.

As with other devices in the orthodontic armamentarium, the oral screen is not a solution for all cases. Its apparent simplicity should not be construed as a simplification of orthodontic case management. In the majority of cases, the oral screen should be considered as a palliative or interceptive device to be used in conjunction with other forms of therapy. The operator should be prepared to institute additional measures of correction at the proper time.

SUMMARY AND CONCLUSIONS

The effectiveness of the oral screen in correcting protrusions of the maxillary anterior teeth was evaluated in 146 unselected cases treated by one operator (A.K.T.). Evaluation was made from models by the operator and checked by two observers from photographs of these models.

This study showed that the oral screen effectively reduced the upper anterior protrusion in approximately one-half the unselected cases. The percentage was considerably higher in cases with spacing of the incisors before treatment than in those with no spacing. In fact, almost all cases in which incisor alignment became worse after treatment were those in which there was no spacing or even crowding of the upper incisors before treatment. Lack of spacing is therefore considered to be a contraindication to the use of the oral screen as an active tooth-moving appliance. The oral screen was also much more successful in cases with normal molar relations than in those with Class II molar relations.

The oral screen was very effective in the correction of anterior protrusions caused by finger-sucking.

The oral screen is not a "universal appliance" but is a very useful device which can be used effectively, especially during the mixed dentition period. Selection of cases, as indicated above, should yield a high percentage of successful corrections of upper anterior protrusions.

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Editorial

FREDERICK S. McKAY

FREDERICK S. McKAY, who conceived the practice of adding fluorine to drinking water to preserve human teeth, died on Aug. 22, 1959, in Colorado Springs, Colorado, at the age of 85 years.

It was in the summer of 1908 that Dr. McKay and other Colorado dentists induced Dr. G. V. Black of Chicago and others to go to Colorado and investigate the fact that many children born and reared in the Colorado Springs, Colorado, area developed brown stains on their teeth. Subsequently, there followed many years of investigation in various parts of the United States in which Dr. McKay played the leading role. These investigations revealed that the brown stains (mottled teeth) were caused by the presence of too much fluoride in drinking water and that a lesser amount of the chemical reduced dental decay.

Dr. McKay was one of the very early orthodontists to locate in the West. After taking Dr. Angle's course in St. Louis, Missouri, in about 1900, he practiced orthodontics in St. Louis for a short time and then settled in Colorado Springs. He later shifted his practice to periodontology and moved to New York City. In 1940 he returned to Colorado Springs, where he practiced until recently, when his health failed.

Thus passes another of the early pioneers in orthodontics. There is little doubt that Dr. McKay's practice, which was mostly with children, first attracted his attention to the brown stain that was so prevalent in the Colorado Springs area. Dr. McKay's contribution to dentistry was probably one of the most important of all time, and his work led to the modern process of the fluoridation of domestic drinking water in many localities.

Dr. McKay was born in Lawrence, Massachusetts. He is survived by his wife, Gertrude, two daughters, and two nephews.

He was secretary of the American Society of Orthodontists when it first met in Detroit, Michigan, about fifty years ago.

H. C. P.

Reports

EDITOR'S REPORT, AMERICAN ASSOCIATION OF ORTHODONTISTS

YOUR JOURNAL completed the publication of its forty-fourth volume Dec. 31, 1958, and in about seven more months it will have completed forty-five years. As yet it has not missed one single month of going to press. In five more years the JOURNAL will have been in service to orthodontics for one-half century.

Being the only person still connected with the JOURNAL (who stood by at its birth in 1915), I am hopeful that the JOURNAL can make it under the wire to the half-century mark without the loss of one issue.

Your editor has presented formal annual reports to this Board from year to year in regard to the operation and direction of the JOURNAL, and an annual report has been made by the chairman of the Editorial Board. The chairman, this year Dr. John Richmond of Kansas City, Kansas, expects to read his report before you. I am sure that his report covers the business relations of the JOURNAL with the publishers, The C. V. Mosby Company of St. Louis, Missouri.

Each year the editor has picked some particular phase aside from the usual routine procedures that it is thought may be of interest to your Board. Last year this report provided information about the outline and plan of publication of the profiles in process. Simply stated, that report pointed out that we are publishing biographical sketches of outstanding leaders in the field of orthodontics who have contributed much to the specialty of orthodontics.

May I repeat then that the Editorial Board and the authors are very proud of this series? Various special journals devoted to the advancement of the specialties of medicine from time to time do publish profiles of outstanding workers who contributed much to the creation and progress of their specialty. In this way, every few months there is created an additional link in the chain of the record of the histories of the pioneers of the particular specialty. It has been proved that the profile section of highly specialized journals has great reader interest and is a very popular section of the JOURNAL. For more complete detail, you may refer to the 1957 report (AMERICAN JOURNAL OF ORTHODONTICS **12**: 782, 1957).

This year let me report another circumstance that has been responsible for a great deal of correspondence and discussion among members of our Editorial Board. Among other changes during these times is the change that has occurred in the method of the presentation of our own orthodontic papers before orthodontic societies and groups. During the former years of the life of your

JOURNAL, essayists usually prepared a formal manuscript long in advance of presentation to the group. This manuscript was usually carefully prepared for publication along with perhaps eight or ten illustrations and was all ready to process.

Nowadays the procedure is much different. The essayist usually lectures from a long series of colored slides and prepares sparse formally written manuscript. In a word, the manuscript is not prepared for publication at the time it is presented, and if it is to be recorded, it requires a complete compilation and reconciliation with less slides than the essayist has shown. Sectional Editor Joseph D. Eby, of the Northeastern Society, has given this matter much thought and attention and has deemed the trend of sufficient importance to make this subject a part of his report before the Northeastern Society in 1959.

Here is a quotation from the Eby report that pinpoints the current situation better than I can write it:

> A glimpse of the seventeen papers from the eight Sectional Societies, their distribution or average of two each, reveals the outpost of particular concern. For translation into the JOURNAL, these papers represent subjects of author interest, many of prohibitive spaçe; length, and expense, without such foresight in preparation, and difficult to re-edit as in one paper published requiring twenty-seven pages, and two others covering 24 and 25 pages.
>
> In the present trend of extemporizing from notes and ad-libbing, numerous illustrations, many of the most valuable papers become unavailable to the JOURNAL and lost to the benefits of the more studious reader circulation. This continued situation is what principally suggested the supplementary "Authors' Digests" of approximately 1,500 words and five to six key illustrations (prepared in advance of the meeting) for both the formal papers and those not otherwise submitted.

Dr. Eby's suggestions have been called to the attention of all of our sectional editors, and it is to be hoped that the "digest of papers" idea will enable the JOURNAL to record more of the papers currently read before our official societies than are now available for publication.

In a word, then, what this report is saying to you is that many of your formal papers are not being published in the JOURNAL for the very simple reason that they are not prepared for publication by the authors.

This problem could probably be partially solved by a request from the Program Committee, at the time invitations are extended, that at least a digest of each contribution be prepared for publication in the official journal of the organization.

There are many, many things that could be reported to you if time were available. However, the above highlights editorial problems for the current year. The remainder of the problems no doubt can remain until such time as they become acute and at least not soluble by the Editorial Board.

In closing, I would like to say that your JOURNAL is made possible by a very loyal group of dedicated editors, authors, and workers, all of whom, with the exception of the editor-in-chief, serve without compensation of any kind whatsoever. I wish to publicly thank this group for their fine cooperation.

Respectfully submitted,

H. C. POLLOCK, SR., Editor

ANNUAL REPORT OF THE NECROLOGY COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

FOLLOWING the 1958 session, secretaries of all constituent societies were requested by our Committee to notify us of the passing of any of their members. Obituaries and/or resolutions, especially the exact dates of their birth and death, were requested. Editor Pollock very kindly inserted a similar notice in our JOURNAL. Information was thus obtained on all but one of our deceased members.

The deceased members are reported by constituent societies:

Central Section:	
Everett Willis Bedell	Oct. 27, 1895-May 5, 1958
William W. Martin	Dec. 30, 1883-June 15, 1958
John E. McDermott	Oct. 20, 1901-Feb. 26, 1959
Lloyd Steele Lourie	Sept. 3, 1887-March 12, 1959
Great Lakes:	
Herbert M. Riemenschneider	Sept. 1, 1901-Oct. 15, 1958
Middle Atlantic:	
Earl Wiles Swinehart	Sept. 21, 1875-July 20, 1958
Raymond T. Scull	Nov. 28, 1897-Aug. 19, 1958
Donald H. Glew	April 2, 1959
Pacific Coast:	
Earl F. Lussier	Oct. 31, 1892-Feb. 24, 1959
Jesse A. Linn	June 2, 1895-July 23, 1958
Homer A. Dahlman	Sept. 27, 1895-May 9, 1958
Northeastern:	
Ralph A. Goppelt	May 5, 1904-Oct. 20, 1958
Robert J. DiTolla	Feb. 11, 1904-Oct. 21, 1958
Joseph Schure	April 30, 1903-Dec. 12, 1958
Alfred Paul Rogers	July 5, 1873-April 6, 1959
M. Albert Munblatt	
Harry B. Wright	Aug. 26, 1898-May 21, 1958
Harry L. Logan	May 20, 1881-Aug. 23, 1958
Rocky Mountain:	
No deaths reported	
Southern:	
Thurmond C. Sparks	July 14, 1895-Oct. 10, 1958
Southwestern:	
Guy M. Gillespie	April 27, 1899-Aug. 20, 1958

Our Committee recommends that, when advised in time, we be instructed to send flowers or suitable memorial for the funeral service of deceased members.

Our Committee also recommends a budget of $300.00 to be used if and when necessary.

William S. Smith
John A. Atkinson
Ernie Bach, Chairman

REPORT OF THE CONSTITUTION AND BY-LAWS COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

PRESIDENT-ELECT Anderson has called the attention of the Committee to the fact that the By-laws do not provide for the election or appointment of the chairman of the Committee on Credentials. Your Committee notes that no provision existed in the previous printing of the By-laws. A check with the secretary-treasurer's office discloses that in the past the president had appointed the chairman of this Committee. In order to legalize such appointment, your Committee recommends that Chapter V, Section 5 be amended by adding a new sentence after the first sentence in the first paragraph: "The President shall appoint the Chairman of this Committee." As amended, Chapter V, Section 5, first paragraph will read: "The Committee on Credentials shall consist of three members appointed by the President for a term of one year with the Secretary as ex-officio member. The President shall appoint the Chairman of this Committee." The Committee shall pass on applications of guests who wish to attend our annual sessions. These applicants would have to meet the following requirements:

Your Committee is in receipt of a letter from Warren A. Kitchen, secretary of the Pacific Coast Society of Orthodontists, addressed to Dr. Shepard, enclosing a legal opinion from Anthony J. Kennedy, counsel of the California State Dental Association, pointing out that the present By-laws limit the prequalification of senior associates to the wording of the By-laws, namely: "an orthodontist who had been a member of the American Association of Orthodontists for not less than eight years at the inception of the associateship." In a rather lengthy opinion he points out the limitations imposed on the Qualifying Committee or similar committee at the constituent and/or component level and suggests that the following clause be added to protect the Qualifying or similar Committee: ". . . and who has been approved by the Qualifying Committee, or similar Committee, as qualified to act as a preceptor prior to the approval of the associateship."

In view of this legal opinion and its attendant explanation, your Committee recommends that Chapter 1 of the By-laws, Section 2, Subsection (A), 2, be amended by striking the period in the eighth line after the word "associateship" and adding the words: "and who has been approved by the Qualifying Committee, or similar Committee, as qualified to act as a preceptor prior to

the approval of the associateship." As amended, the second sentence in Section 2, Subsection (A), 2, will read: "This practicing member shall have been an active member of the American Association of Orthodontists not less than eight years at the inception of the associateship and who has been approved by the Qualifying Committee, or similar Committee, as qualified to act as a preceptor prior to the approval of the associateship."

It has been called to the attention of the By-laws Committee that in several instances where the secretary-treasurer has been notified of the inception of an associateship, a check of the qualifications of the senior preceptor has revealed that he fails to qualify under the existing By-laws by not having been an active member of the American Association for the required eight years. However, it is found that this member who wishes to qualify as a senior preceptor is a diplomate of the American Board of Orthodontics, and the Committee believes that consideration should be given to whether diplomates of the American Board of Orthodontics should be placed in a separate category as far as prequalifications are concerned and not be subject to the eight years of active membership as presently required in the By-laws.

Respectfully submitted,

Oren A. Oliver
Donald C. MacEwan
Philip E. Adams, Chairman

REPORT OF THE MILITARY AFFAIRS COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

THE Military Affairs Committee of the American Association of Orthodontists wishes to report a very quiescent situation in regard to military demands upon the members of this Association.

At present, and for some time past, the annual supply of dental graduates has been more than adequate to meet the requirements of the Armed Forces in their notably reduced size. This is further emphasized by the fact that dental care of dependents, terminated several years ago except in areas of foreign service or in remote sections of the United States, is now being re-established by the Army in most installations and also by the Air Force to some extent. Such dental care does not include orthodontic service in stations within the continental limits of this country; overseas it is provided largely by regular-duty dental officers.

Thus, the Armed Forces display no definite need for the specialized talents of our members; nor are their services required even to furnish treatment in the field of general dentistry. In view of the large numbers of dental graduates of the present day, it seems evident that the membership of this Association need have no cause for concern while conditions remain static.

So long as the Cold War exists, however, we cannot overlook the possible occurrence of sudden hostilities which could involve this country in various

parts of the world. Although it is expected that the Ready Reserve would serve to absorb some of the force of the accelerated demand for dentists, it is obvious that even partial mobilization would affect at least the younger members of this Association.

On the other hand, encouragement can be drawn from the report that the Selective Service System no longer even has a dental official in charge of the recruitment of dentists. In view of this and the fact that your Committee has received no complaints or requests for assistance, it is pleased to characterize the present state of affairs as "all quiet."

Respectfully submitted,

Marion A. Flesher
Paul V. Reid
Hugh A. Sims
C. Douglas Hoyt
D. Robert Swinehart, Chairman

REPORT OF THE PUBLIC RELATIONS COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

IN ITS official capacity the Public Relations Committee has experienced a relatively uneventful year. There has been no official communication of complaints from the sectional societies. Likewise, the matter of the Federal Trade Commission affair now appears to be dormant.

However, the Public Relations Committee has several items of paramount importance channeled to its attention. The word "attention" is significant in that the realm of the items to be herewith mentioned may or may not be matters of direct concern to this Committee. Thus in an official capacity your Committee is without authority to act on these items, but it has unanimously concurred that these items merit attention.

Item 1.—With the realization that public relations is a complex problem, there exist many avenues for consideration by this Committee. Of particular interest are such broad, yet vitally important, problems as intraprofessional and interprofessional relations, problems within our specialty, and problems with other allied professional as well as lay groups. It is realized that a solution to these problems merits detailed, time-consuming endeavors.

Specifically, the role of public relations involves the unraveling of past heritages of orthodontic problems, as well as the elimination of future disharmonies.

It is therefore recommended that attention to these matters be presented to the Board of Directors of the American Association of Orthodontists for official action.

Item 2.—This Committee has been informed of the possibility, as well as the need for, the selection of a paid executive secretary for the American Association of Orthodontists.

It is herewith strongly recommended by this Committee that if such action is deemed favorable by the Board of Directors, such individual be well versed and qualified in the field of public relations.

Respectfully submitted,

RICHARD A. LOWY
JAMES C. BROUSSEAU
FREDERICK R. ALDRICH, Chairman

REPORT OF THE NOMENCLATURE COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

THERE was no official meeting of the Nomenclature Committee this year. Only one problem arose: Dr. H. C. Pollock, editor of the AMERICAN JOURNAL OF ORTHODONTICS, reported a continuing need for an official decision on the correct name of the specialty to end the confusion among authors of orthodontic manuscripts. The derivation of the two principal conflicting terms, *orthodontia* and *orthodontics,* was given in an editorial in the November, 1958, issue of the JOURNAL. A copy of the editorial is attached to this report.

The Nomenclature Committee recommends that the Board of Directors of the American Association of Orthodontists adopt the term *orthodontics* as the official name of the specialty.

Respectfully submitted,

JAMES D. MCCOY
WILLIAM S. BRANDHORST
B. F. DEWEL, Chairman

In Memoriam

JACK H. TAYLOR*

JACK H. TAYLOR, El Centro, California, orthodontist and son of Dr. John E. Taylor, long-time Hollywood orthodontist, died recently at the age of 50 in the crash of a plane that he was piloting near his home town.

Jack was reared in Hollywood and practiced general dentistry there. He showed an interest in oral surgery (courses with C. Maynard Woodard) and prosthetics (courses with Milus House), until he returned to his alma mater, the University of Southern California, for postgraduate training in orthodontics.

Thereafter he established an orthodontic practice in Santa Monica, where he could be close to his true love, the sea. He owned and sailed a number of boats, served as navigator on several yacht races to Hawaii and Bermuda, and built himself a home overlooking the ocean.

When war came, he insisted on joining the Navy (subchaser duty) as a sailor rather than as a dentist. He was subsequently transferred from the Navy to the Office of Strategic Services, where he served for a time as chief instructor of the OSS Maritime School (navigation, seamanship, underwater maneuvers, fieldcraft, demolition, etc.).

He was sent overseas and operated out of Cairo, Egypt, and Bari, Italy. He planned and executed sorties behind enemy lines, bringing in persons, supplies, and arms. He brought out survivors of plane crashes, rescued fellow operatives, and secured much-needed intelligence, as well as making contact with pro-Allied forces.

These sorties (some fifteen in number) were to the Aegean area (Samos, Turkey, Leros, and Castellorizo), Yugoslavia, Albania, the Greek islands off Corfu, and Austria. Often on these ventures he was subjected to dive-bombing, strafing, and machine-gunning.

A short period was spent in the hospital and at refresher courses in parachuting, radio-operating, etc., before his ill-fated sortie into Austria where friendly inhabitants, under German torture, were forced to betray him. He was captured by the Gestapo and incarcerated in Vienna Prison, where he was systematically beaten for four months while our Air Force simultaneously bombed the city. He was transferred to the Mauthausen Concentration Camp

*Many orthodontists have heard indirectly of the amazing war record of Dr. Jack Taylor of California. At the request of the editor, Dr. Harry Cimring of Beverly Hills, California, very kindly agreed to prepare this short summary of Dr. Taylor's wonderful record.

for execution but was saved by the intervention of a friendly Czech inmate who was able to switch his name in his capacity as jail trusty. Jack, when liberated by Allied troops, was ulcer-ridden and down to a mere 110 pounds in weight. However, he coolly proceeded to gather what is, according to Navy estimates, probably the best single collection of first-hand evidence on war crimes, including documents, pictures, and eyewitness testimony. After the war he returned to testify at the Nuremberg War Crimes Trials. He was awarded the Navy Cross, a Bronze Star, the Distinguished Service Cross, and the Purple Heart.

Returning to his home and practice, he became involved in flying and owned a number of light planes. He also became greatly interested in Mexico and moved his practice to El Centro, ten miles from the Mexican border. In his own craft he made many daring and hazardous flights, such as those from

JACK H. TAYLOR

Louisiana to Yucatan and from the tip of Baja, California, to the mainland of Mexico. His plans were to establish a sportsman's lodge at Caleta Linda at the remotest point of Baja, California. He worked toward this end as much as his health permitted.

Jack is survived by his wife, Anita; his daughter, Sallie (by a former marriage); and his parents.

As Tobias Smollett, the English novelist, once wrote:

> "Thy spirit, Independence, let me share,
> Lord of the lion-heart and eagle-eye;
> Thy steps I follow, with my bosom bare,
> Nor heed the storm that howls along the sky."

Harry Cimring

ALLEN EVERETT SCOTT

ALLEN EVERETT SCOTT died on Aug. 14, 1959, at his home in Woodside, California, at the age of 69 years. His death followed a long cardiac illness.

A native of Maxwell, California, Dr. Scott practiced in San Francisco for forty-one years. He graduated from the University of California in 1916, served in the army in World War I, taught on the University of California faculty for some time, and years ago served on the Board of Directors of the San Francisco Dental Society.

As one of our early San Francisco orthodontic specialists, after postgraduate work at the Forsyth Dental Infirmary for Children in Boston, Massachusetts, he joined his uncle, Allen H. Suggett, who was a true pioneer in orthodontics on the Pacific Coast and a former professor of orthodontics at the University of California.

In addition to committee assignments, Dr. Scott served as president of the Pacific Coast Society of Orthodontists in 1932-1935, was a diplomate of the American Board of Orthodontics, and a member of the Delta Sigma Delta fraternity.

He was a man of high ideals, conscientious in his work, and highly esteemed among his confreres. He took pleasure in helping needy and deserving patients.

We were warm friends and neighbors in the old Butler Building for our entire professional careers. Dr. Scott, his lovely wife, Pauline, and I spent many a pleasant hour together in discussion and social relaxation.

Dr. Scott is survived by his widow, Pauline, and his sister, Mrs. Cecil Straub of Yuba City, California, to whom our sincerest condolences are extended.

Reuben L. Blake

HARRY B. WRIGHT
1898—1958

HARRY B. WRIGHT of Philadelphia, Pennsylvania, died on May 21, 1958, at the Pennsylvania Hospital.

Dr. Wright was born on Aug. 26, 1898, in Phillipsburg, Pennsylvania. He was graduated from the dental school at the University of Pennsylvania in 1918 and received his orthodontic training at the Dewey School of Orthodontia in 1919. He was a life member of the Philadelphia Museum, a member of the Explorers Club of New York, the New York State Society of Orthodontics (now the Northeastern Society of Orthodontists) since 1926, the Philadelphia County Dental Society, and the Pennsylvania State Dental Society.

Dr. Wright was the author of *Witness to Witchcraft* (published by Funk & Wagnalls Company, New York) and a photographer of note. His photography won him many prizes, including the highest award of the American Annual Salon of Photography in 1933. Only last year Dr. Wright had made a trip to the country of the head-hunters in Dutch New Guinea. He sent back a collection of spears, shields, dugout canoes, and other articles. He had also previously visited Ecuador, Mexico, Bolivia, Guatemala, and South Serbia.

His contributions to orthodontics were many. His career of nearly forty years as a member of our specialty was most noteworthy.

Surviving are two brothers, Drs. William W. Wright of Pittsburgh, Pennsylvania, and Louis W. Wright of Harrisburg, Pennsylvania, and two sisters, Mrs. Meyer Balistocky of New York City, and Mrs. Nathan Katinsky of Ardmore, Oklahoma.

WHEREAS our society has lost a valuable member,

BE IT RESOLVED that this resolution be engrossed on our minutes as a memorial to one who made many contributions to knowledge, and

BE IT FURTHER RESOLVED that a copy of this resolution be sent to the members of Dr. Wright's family as an expression of our deep sympathy and heartfelt condolence.

Arthur V. Greenstein.

ROBERT J. DI TOLLA
1904—1958

ROBERT J. DI TOLLA was born in New York City on Feb. 11, 1904. He attended and graduated from New York City public elementary schools and from the New York Evening High School. He took his predental courses at New York University Washington Square College and matriculated at the New York University College of Dentistry, from which he graduated in 1931. He was a member of the Xi Psi Phi dental fraternity.

After graduation, he interned at Bellevue Hospital in New York City and entered private practice in 1932. He married Kathleen Canapary the same year. They have six children, ages 20 to 11: Robert, James, William, Kathleen, Edward, and Donald.

In 1938 Dr. DiTolla took the postgraduate orthodontic course at New York University and became a faculty member in that department in 1940. He was promoted to the rank of assistant clinical professor of orthodontics several years later.

Among the many organizations with which he was affiliated and in which he held office were the Northeastern Society of Orthodontists, New York University Orthodontic Society, First District Dental Society of New York, Italian Dental Society of New York, and Catholic Dentists' Guild. He was also a Fellow of the American College of Dentists and the New York Academy of Dentistry. He had been consulting orthodontist for the Murry and Leonie Guggenheim Dental Clinic and The Hudson Guild Dental Clinic. He was chief of the orthodontic service of the Northern Dispensary in Greenwich Village. He was active in the New York University Alumni Federation and the Dental Alumni Association, in both of which he held many offices. He was awarded the Alumni Meritorious Service Medallion.

He made his home in Glen Rock, New Jersey, where he also conducted an orthodontic practice in addition to one at 233 East 52nd St., in New York City. He died suddenly at the latter address on Oct. 21, 1958, after attending the last patient for the day.

WHEREAS the members of the Northeastern Society of Orthodontists learned with deep regret of the passing of Dr. Robert J. DiTolla,

BE IT RESOLVED that the Society place a resolution noting our loss on record and that an appropriate message of sympathy be sent to Mrs. DiTolla and her family.

Arthur V. Greenstein.

JESSE A. LINN
1895—1958

JESSE A. LINN of Los Angeles, California, died on July 23, 1958, at the age of 63 years.

Dr. Linn graduated from the University of California Dental School in 1919. One of the few men of that time to have a B.S. degree before entering dental school, he was always one of the top ten in his class. He practiced general dentistry for one year and then studied under Dr. Angle in Pasadena.

Dr. Linn was a strong believer in functional anatomy of the teeth and in balanced occlusion. He was best known for his conservative approach to orthodontic problems and for his work on functional balance in the dentition. He was a charter member of the Edward H. Angle Society of Orthodontia and a member of the Pacific Coast Society of Orthodontists and the American Association of Orthodontists.

The mountains of northern California were his favorite recreation grounds. He had traveled quite extensively in Europe, South America, and most recently in the Far East, from which he had returned only a few months prior to his death.

Dr. Linn was married and the father of two children, one of whom, Dr. Allen Linn, is practicing orthodontics in Beverly Hills, California. We extend our deepest sympathy to Mrs. Linn and their two children.

Warren A. Kitchen.

GEORGE LEE TURNER
1894—1958

GEORGE LEE TURNER of Pacific Palisades, California, died on Dec. 7, 1958, in Santa Monica, California, three weeks after undergoing heart surgery.

Dr. Turner was born on July 26, 1894, near Columbia, Missouri. He graduated from Centralia (Missouri) High School in 1913; General City Business College in Quincy, Illinois, in 1914; Western Dental College in Kansas

City, Missouri, in 1919; and the International College of Orthodontics in Kansas City, Missouri, in 1924. After his discharge from the U. S. Army, he first practiced dentistry in Bartlesville, Oklahoma. He went to Wichita, Kansas, in 1924 and entered the exclusive practice of orthodontics. In 1933 he moved to Los Angeles, California, where he continued to practice orthodontics until he retired in 1952.

He was a member of the American Association of Orthodontists and the Pacific Coast Society of Orthodontists. He was a Fellow of the International College of Dentists and other honorary fraternities. He belonged to the Kiwanis Club, the Wilshire Chamber of Commerce, and the Baptist Church.

Dr. Turner is survived by his widow, Mrs. Esther M. Turner, three sisters, and two brothers.

Our deepest sympathy is extended to Mrs. Turner in this hour of bereavement.

Warren A. Kitchen.

JOSEPH SCHURE
1903—1958

JOSEPH SCHURE was born on April 30, 1903, and died on Dec. 12, 1958.

Dr. Schure entered New York University Dental School in 1921; he was secretary of the Class of 1925, the year of his graduation. He graduated with honors and was associate editor of his class year book. His abilities were soon recognized, and he was appointed editor of the *Bulletin* of the Kings County Dental Society in 1942.

After the amalgamation of the constituent societies of the Allied Dental Council with the New York State District Societies, he became active in committee work in the Second District Dental Society. He was chairman of the Postgraduate Study Committee and was editor in 1952 of the *Bulletin* of the Second District Dental Society, during which period he changed its format. He was chairman of the Joint Liability Insurance Committee of the First and Second District Dental Societies, through which he was instrumental in producing the film, "The Prevention of Malpractice Claims," whose scenario he helped to write. He gave unstintingly of his time and energy for many years as chairman and worker in the dental divisions of the various Jewish philanthropies.

Dr. Schure was also a diplomate of the American Board of Orthodontics.

He leaves a wife, Mrs. Edythe Schure, and two daughters, Deborah Marion and Adrienne Carol.

WHEREAS the members of the Northeastern Society of Orthodontists learned with deep regret of the passing of Dr. Joseph Schure,

BE IT RESOLVED that the Society place a resolution noting our loss on record and that an appropriate message of sympathy be sent to Mrs. Schure and her family.

Arthur V. Greenstein.

EARL FABIAN LUSSIER

EARL FABIAN LUSSIER of Atherton, California, died of a virulent bacteremia on April 7, 1959, at the age of 67 years.

Dr. Lussier was a native of Owatoona, Minnesota, and a 1924 graduate of the University of California where he served on the orthodontic faculty for twenty-five years. He formerly practiced in San Francisco for many years. He later moved his office to San Mateo, but he maintained his connection in San Francisco in the office of his brother, Ray Lussier. He served most efficiently as secretary of the Pacific Coast Society of Orthodontists for many years.

Dr. Lussier was a diplomate of the American Board of Orthodontics, a Fellow of the American and International Colleges of Dentists, and a member of Delta Sigma Delta fraternity, the California Academy of Periodontology, and the Olympic Club.

In addition to his professional activities, he was a member of St. Pius Parish of Redwood City, a fourth-degree Knight of the Fra Crespi Assembly, and the Knights of Columbus #1346 of San Mateo. He was past president of the Serra Club of San Francisco, a member of the Serra Club of San Mateo County, and captain of Los Altos Retreat Association for more than twenty-five years.

He had a genial and sincere personality and was highly esteemed by his confreres, who will miss his friendly smile and warm handclasp at future dental gatherings.

Dr. Lussier is survived by his widow, Mrs. Marilla Lussier; five daughters, Mrs. Marilla Madden, Mrs. Joan Dineen, Mrs. Jeanne Ennis, Mrs. Yvonne Robb, and Mrs. Marguerite Savage; three brothers, Clifford Lussier and Drs. Norman and Ray Lussier; and twenty-three grandchildren.

Warren A. Kitchen.

LAWRENCE SINGLETON
1868-1959

LAWRENCE G. SINGLETON, 91, a pioneer orthodontist who practiced in Santa Barbara, California, for many years and a prominent member of the Rotary Club there, died on May 11, 1959.

Dr. Singleton was born on Feb. 4, 1868. Early in his life he was afflicted with failing eyesight. When a Denver physician was able to correct the eye difficulty, Dr. Singleton quit his job as a telegraph operator and entered college.

He began his dental career in his hometown of Beaver, Pennsylvania, after graduating from the University of Cincinnati in 1898. He practiced there for eleven years, after which he attended and graduated from the Angle School of Orthodontia in New London, Connecticut, in 1909. He practiced orthodontics in Pittsburgh, Pennsylvania, until 1925, at which time he moved to Santa Barbara, California.

Dr. Singleton was an honorary member of the Angle Society of Orthodontics, the American Dental Association, and the Tweed Foundation for Orthodontic Research. He was a 32nd degree Scottish Rite Mason, a Shriner, and a member of the Presbyterian Church.

His wife, Annie Emily Scroogs Singleton, and one son preceded him in death. He is survived by his daughter, one brother, and three grandchildren.

Department of Orthodontic Abstracts and Reviews

Edited by
Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City.

The Cranial Base: By J. H. Scott. *Am. J. Phys. Anthropol.* **16**: 319-348, September, 1958.

In the human adult the cranial base consists of the following elements, from behind forward: (a) the basal part of the occipital bone; (b) the spheno-occipital synchondrosis, which persists to the age of about 17 to 20 years; (c) the body of the sphenoid bone; (d) the spheno-ethmoidal suture, which is continuous laterally with the frontosphenoidal sutures on the floor of the anterior cranial fossa; (e) the cribriform plate region of the ethmoid bone uniting the midline mesethmoid (perpendicular plate and crista galli) with the bilateral facial parts of the ethmoid; (f) the fronto-ethmoidal suture and the foramen caecum; and (g) the frontal bone (glabella region).

For growth study purposes the cranial base can best be divided into three segments: (1) basion to pituitary point (posterior segment), (2) pituitary point to foramen caecum (middle segment), and (3) foramen caecum to nasion (anterior segment). In the majority of studies on the cranial base the second and third segments together make up the anterior segment.

The cranial base, from the foramen magnum to the region of the foramen caecum, is preformed in cartilage which is continuous with the cartilage of the nasal capsule, the latter including the cartilage of the nasal septum. The frontal bone develops in membrane above and slightly in front of the anterior end of this great mass of cartilaginous tissue extending from the foramen magnum to the front end of the nasal septum. In this mass of cartilage, ossification centers appear from behind forward in the following order: (1) a single center for the basioccipital about the middle of the third month of fetal life; (2) two to four centers for the postphenoid about the end of the fourth month of fetal life; (3) two centers of the presphenoid during the fourth to the fifth months of fetal life; and (4) a single center for the mesethmoid during the first year after birth.

These various parts unite with one another as follows: (1) The two parts of the sphenoid united in man during the last month of fetal life are united at birth. (2) The mesethmoid unites with the facial parts of the ethmoid by ossification of the cribriform plate between the first and third year. (3) The occipital unites with the sphenoid between the ages of 17 and 20 years.

At birth the basal part of the occipital is ossified, and the two parts of the sphenoid have just united. The mesethmoid has not yet ossified, so that the nasal septum is still entirely cartilaginous except for the vomer at its lower edge. The spheno-occipital synchondrosis is in the form of a bilateral epiphyseal cartilage contributing to the growth of both the occipital and sphenoid bones.

During the first and second years after birth, there is a great spurt in brain growth. Head circumference increases from 65 per cent to 90 per cent of adult size. The cranial base does not reach 90 per cent of its adult size until about the thirteenth year. Growth of the body as a whole is more constant than growth of the cranial base and head circumference. While head circumference shows a great spurt in growth immediately after birth (first to third year in association with growth of the brain), the cranial base grows most rapidly from the fourteenth to the thirty-second weeks of fetal life, with a period of less rapid growth during the last two months, a second spurt during the first years after birth, and a gradual slowing after about the seventh year.

While the growth of the posterior (basion-pituitary) and anterior (frontal) segments show a growth pattern similar to that of the cranial base as a whole, the middle (ethmoidal) segment reaches adult dimensions by about the seventh year. This early stabilization of the ethmoidal region is overlooked in the use of measurements of the anterior cranial base taken from the pituitary fossa to nasion, as this measurement includes the frontal bone which continues to increase in thickness until adult life.

The available growth sites in the human cranial base after birth are as follows:

(1) At the foramen magnum. The foramen magnum in man unlike that in the anthropoid apes, does not show any evidence of backward migration.

(2) At the spheno-occipital synchondrosis. This is an important growth center until the beginning of adult life. It has been shown that it is situated in such a position relative to the coronal and lambdoid sutures as to influence the growth of the cranial vault in the anteroposterior dimension.

(3) The spheno-ethmoidal and fronto-ethmoidal sutures. These with their lateral extensions (the frontosphenoidal sutures at the floor of the anterior cranial fossa) join the coronal suture system at pterion and are situated in the same coronal plane as the retromaxillary suture systems (in the pterygopalatine fossa). As the distance from pituitary fossa to foramen caecum remains constant after about the seventh year, however, there is probably little growth at these sutures after the end of the first decade.

(4) The frontal bone increases in thickness at the glabella region by surface deposition until adult life, and this part of the bone is invaded by the frontal air sinus, especially during adolescence.

Natural Head Position, a Basic Consideration in the Interpretation of Cephalometric Radiographs: By Coenraad F. A. Moorrees and Martin R. Kean. *Am. J. Phys. Anthropol.* **16**: 213-234, June, 1958.

The study reported in this article was made to test the hypothesis that the natural head position of man is relatively constant. Confirmation of this assumption introduces the possibility that an extracranial line of reference (the true vertical) can be used for cephalometric studies. Subsequently, it is possible to determine the reliability of intracranial reference lines with respect to the vertical.

Two groups of 18- to 20-year-old female students at the Forsyth School for Dental Hygienists were radiographed in their natural head position. The

first group, consisting of sixty-six freshman girls, was used in a pilot study in which the natural head position was not changed. Two radiographs, one week apart, were made of each subject.

The sixty-one members of the senior class who made up the second group were radiographed twice, with a time lapse of one week between radiographs. As a precautionary measure, the head position of this group of students was observed prior to exposure and was corrected when necessary.

It was necessary to modify the Broadbent cephalostat to permit radiography of the head without fixation and to record a true vertical on each film.

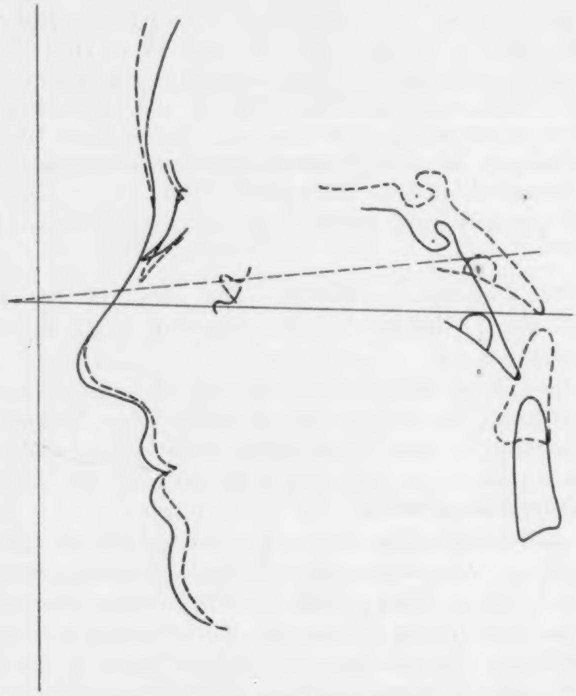


Fig. 1.—(By permission of the publisher, from Fig. 1, Moorrees, C. F. A., and Kean, M. R.: *Am J. Phys. Anthropol.* **16**: 216, 1958.)

Natural head position was recorded with the subjects seated comfortably and relaxed on a stool. They were asked to look into the image of their eyes in a round mirror located at the same level as the pupils of their eyes. The mirror had a diameter of 100 mm. and was attached to the wall 170 cm. in front of the original transmeatal axis of the cephalostat, in a plane parallel to this axis. A tape mark on the front posts of the cephalostat indicated the distance from the center of the mirror to the floor. When the subjects were seated, the stool was raised to bring the interpupillary line to the level of the tape.

Nasion and the midpoint of the outline of sella turcica were located on the radiographs. These two landmarks were marked with a needle on the first radiograph, and a tracing of the area was superimposed on the second radiograph of each subject to obtain identical location of these points. The line from nasion to the midpoint of sella turcica was then drawn and extended, if necessary, to intersect the image of the vertical line (V).

The variability of head position at successive observations was determined by statistical analysis of the differences in the angle SNV, according to the formula:

$$\text{S.D.}_{\text{head position}} = \sqrt{\frac{\text{sum of differences}^2}{2n}}$$

The standard deviation of head position in the sixty-six freshman students was 2.05 degrees. In the sixty-one senior students the standard deviation of head position was 1.54 degrees. This finding differed at the 5 per cent level of significance from that obtained in the pilot study according to the *f* test of variance.

The remakable constancy of head position in these young North American women is indicated by the relatively high degree of association between the angles SNV ($r = +0.85$) and the small standard deviation of differences between the angles SNV in the two series of observations.

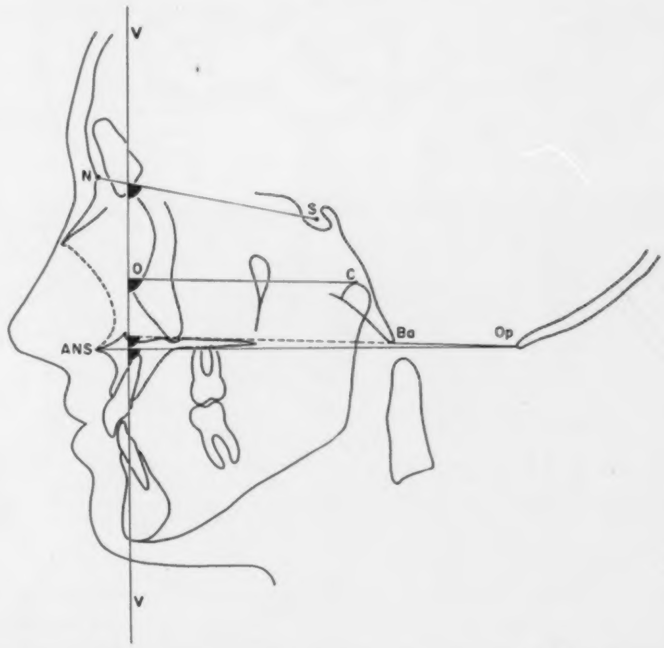


Fig. 2.—Intracranial reference lines. Nasion-sella turcica (*N-S*); Frankfort horizontal, orbitale to highest point on the mandibular condyle (*O-C*); His, anterior nasal spine or acanthion to opisthion (*ANS-Op*); basion-opisthion (*Ba-Op*). The registration of natural head position with reference to the vertical (*V*) is shown also. (By permission of the publisher, from Fig. 4, Moorrees, C. F. A., and Kean, M. R.: *Am. J. Phys. Anthropol.* **16:** 224, 1958.)

Downs, also aware of possible deviations of the Frankfort horizontal from the true horizontal in different persons, photographed 100 orthodontic patients who were standing and looking into their own eyes in a mirror. There was an average of 0.9 degree difference between the Frankfort horizontal and the true horizontal, the lines diverging ventrally. In 1956 Downs reported this difference to be 1.3 degrees, with a standard deviation of 5.0 degrees.

The method presented, in which cephalometric radiographs were obtained with the head unsupported, the eyes looking into a mirror, and the patient seated or standing at ease, may be of advantage also in the registration of the so-called rest position of the mandible.

The self-alignment of patients gives a truer picture of facial asymmetry. When patients are lined up in the cephalostat in accordance with conventional techniques, it is assumed that the transmeatal axis is perpendicular to the midsagittal plane. If this is not the case, the immobilization of the head with ear plugs introduces an asymmetry in proportion to the deviation of the transmeatal axis from the midsagittal plane.

A vertical reference line can be recorded on profile photographs also. This extends the usefulness of photography to the study of prognathism and to clinical orthodontics.

When the relative constancy of head position had been established, it was possible to use the true vertical in determining (1) the reliability of reference lines in the cranium for cephalometric radiography, (2) the relation of these lines to each other, and (3) the ranges of their individual variation.

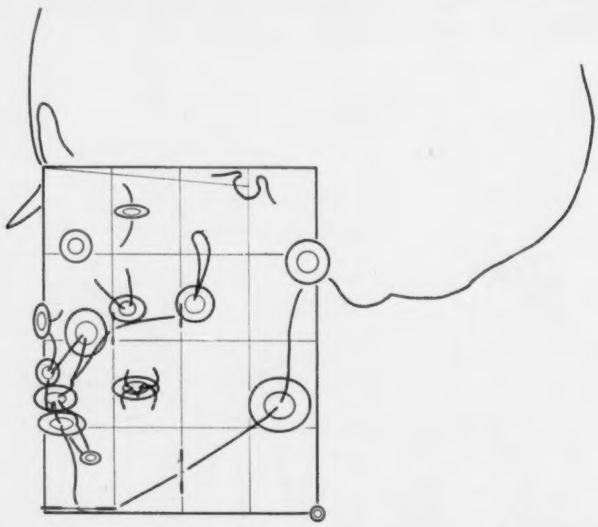


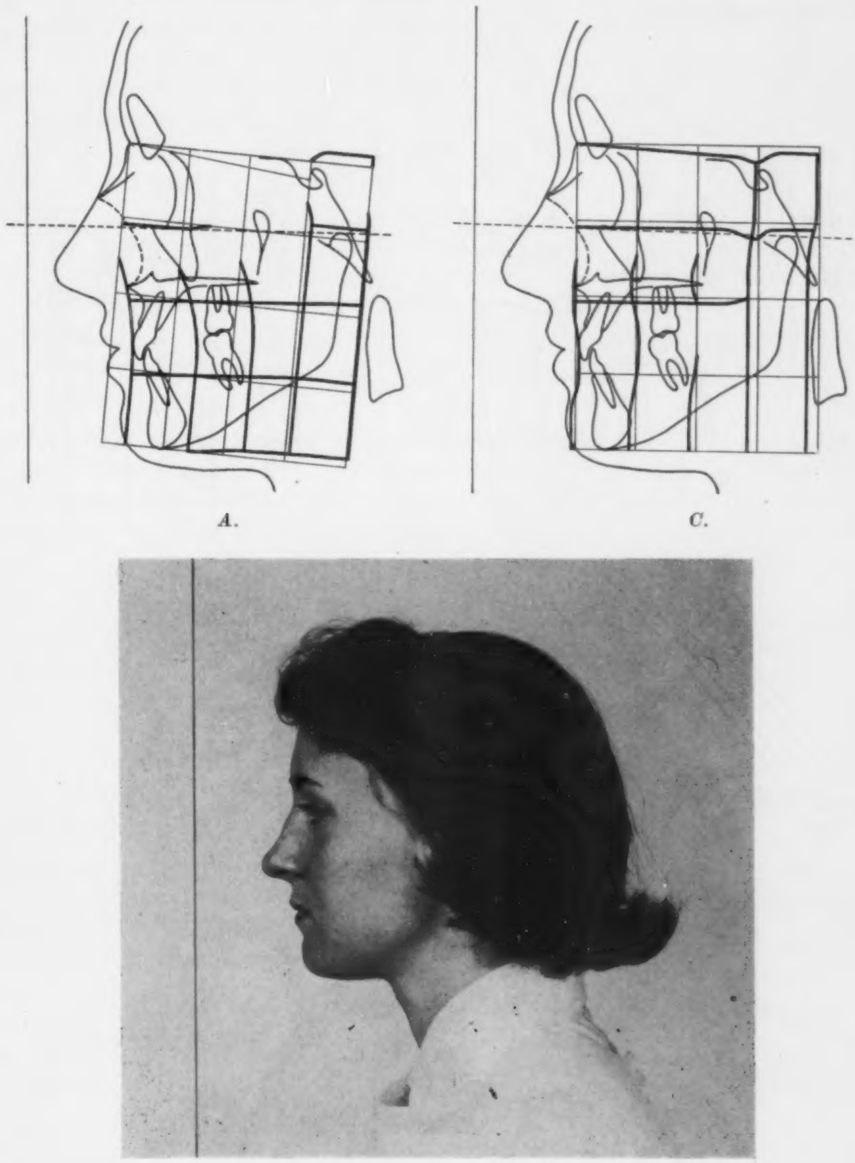
Fig. 3.—The average facial pattern of fifty North American females determined by means of a mesh diagram. The concentric ovals show the ranges of individual variation for the location of landmarks in their respective rectangles at the one and two standard deviation limits. (By permission of the publisher, from Fig. 5, Moorrees, C. F. A., and Kean, M. R.: *Am. J. Phys. Anthropol.* **16**: 228, 1958.)

The two radiographs taken in natural head position of the sixty-one senior students were used for this part of the study. In addition to the line nasion-sella turcica, the Frankfort horizontal, the His line, and a line connecting basion and opisthion were drawn on the first radiographs (Fig. 2).

The landmarks were ascertained, and their location was systematically checked. The highest point of the mandibular condyle was substituted for porion, however, since the latter landmark could not be located with sufficient accuracy. When the shadows of the left and right condylar or orbital points did not coincide, the midpoint was marked.

The Frankfort, His, and basion-opisthion lines were drawn on only one radiograph, and their angulations to the vertical were measured and recorded. The differences between the angles nasion-sella turcica and the vertical on the two radiographs of each subject had already been obtained. The differences for the angulation of all other lines on the two radiographs had to be exactly the same. Hence, the angles between the various reference lines and the vertical on the second radiograph of each subject could be computed by adding or subtracting the difference obtained for the angle SNV.

The variation (S.D. ranges from 3.55 to 6.69 degrees) of these intracranial lines is greater than the variation (S.D. = 1.54 degrees) in registration of head position (P < 0.01). Therefore, the method outlined for obtaining



A. C.

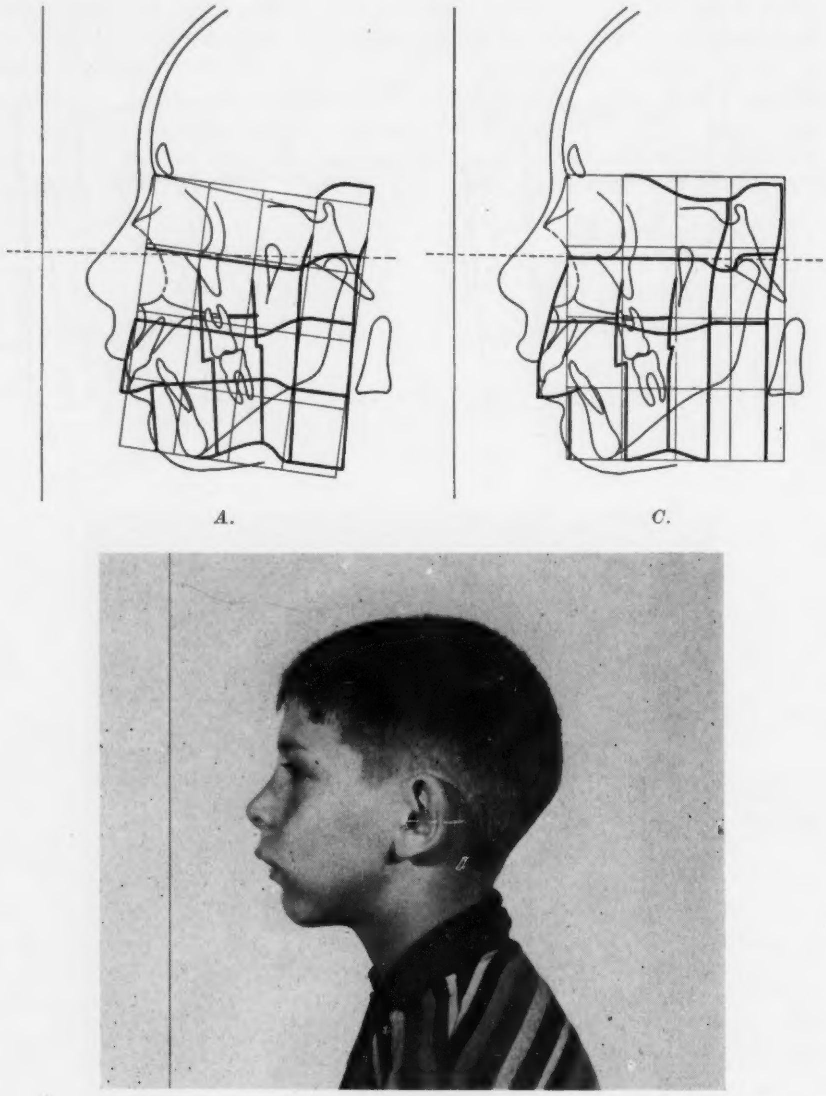
B.

Fig. 4.—Mesh analyses and profile photograph of a Forsyth student. *A*, Mesh diagram constructed on the line nasion-sella turcica; *B*, photograph of the subject; *C*, mesh diagram oriented on the vertical line. The vertical line is shown in *A*, *B*, and *C*.

Since the cranial base has a downward inclination in this instance, the distortions of the mesh diagram based on the line nasion-sella turcica (*A*) give an erroneous impression of the facial configuration. (By permission of the publisher, from Fig. 6, Moorrees, C. F. A., and Kean, M. R.: *Am. J. Phys. Anthropol.* **16**: 230, 1958.)

cephalometric radiographs in natural head position and the use of the true vertical line for reference purposes are more reliable than the routine use of such lines as the Frankfort horizontal or nasion-sella turcica.

Differences between the means of the two series for any line of reference are not statistically significant. In fact, the largest difference between means is no greater than 0.55 degree. Moreover, the standard deviations of the angles of the same reference line with the vertical at subsequent observations do not differ significantly.



A. *C.* *B.*

Fig. 5.—Mesh analyses and profile photograph of an 11-year-old boy. Complete masking of a severe protrusion of the maxillary incisors occurs when the mesh is oriented on the markedly deflected cranial base (*A*). The downward inclination of the cranial base, as well as the protrusion of the maxillary incisors and "normal" mandible, is shown clearly by the distortions of the mesh based on the vertical line (*C*). These findings corroborate the clinical evaluation (*B*). It should be pointed out that the Frankfort horizontal line is perpendicular to the vertical and may be used for cephalometric analysis in this instance. (By permission of the publisher, from Fig. 8, Moorrees, C. F. A., and Kean, M. R.: *Am. J. Phys. Anthropol.* **16**: 232. 1958.)

The importance of natural head position for the interpretation of cephalograms can be shown by the mesh diagram analysis, which illustrates the findings in graphic form.

The line nasion-sella turcica is suitable for the orientation of the mesh diagram on the face. When the cranial base has an upward or downward deflection, however, it may be necessary to discard this variable intracranial reference line and use the vertical, as follows:

1. Draw a line through nasion, parallel to the vertical (line 1).
2. Draw two lines perpendicular to line 1, one through nasion and one tangent to the lowest point on the border of the mandible (lines 2 and 3, respectively).
3. Transfer the distance nasion-sella turcica on line 2 and divide it into three parts.
4. The fourth line of the basic rectangle is parallel to the vertical (line 1) but perpendicular to lines 2 and 3. It is drawn through a point on line 2 at a distance from nasion which is $\frac{4}{3}$ of a length of the distance nasion-sella turcica.
5. The basic rectangle is divided vertically and horizontally into four parts, resulting in a mesh diagram of sixteen rectangles which inscribes the face.

The authors consider that the procedure outlined not only simplifies the technique of cephalometric radiography but that it also facilitates meaningful interpretation of the cephalogram for clinical and research purposes. The technique can be used advantageously in clinical photography and permits cephalometric radiography without a cephalostat. Furthermore, it may provide a new approach to the study of facial asymmetry.

The true vertical, or the horizontal line perpendicular to it, is preferable to reference lines within the cranium, since the biologic variation of the intracranial lines studied is greater than the variation encountered in registration of natural head position.

Abstracts of Papers Presented Before the Research Section of the American Association of Orthodontists, Detroit, Michigan, May 3 to 7, 1959

A High-Speed Radiographic Cephalometric Analysis of Mandibular Movements During the Pronunciation of Certain Labial Consonants by Adults With Normal Speech: By Martin S. Goldberg, Northwestern University, Chicago, Illinois.

This investigation was undertaken in order to (1) determine the range of mandibular movements during the articulation of five labial consonant sounds pronounced in a standard connected speech pattern and (2) evaluate the significance of the difference of the means of the consonant and vowel groups.

Lateral cephalometric radiographs were made of a group of forty-four adults with normal speech as each of five consonant sounds was pronounced. The group was divided into four subgroups of eleven, each of which had a different vowel following the five consonants. The x-ray exposures were taken at one-twentieth of a second. Measurements made of mandibular displacements from rest position of both the center of the condyle and gnathion appear to warrant the following conclusions:

1. The five consonants fall into two groups with regard to the means of their mandibular movements. The smaller-opening consonants are comprised of "f," "p," and "b," and the larger-opening consonants are comprised of "m" and "w."

2. The means of the four vowels studied show a definite and clearly demarcated series which runs in increasing dimension from the vowel "u" to "i" to "a" to "o."

3. When the means of the four vowels are compared with one another, extremely high and significant differences are seen to exist between the four vowel groups.

531 W. 66th Ave.
Philadelphia, Pa.

A Radiographic Cephalometric Investigation of the Palatal Maxillary Structures: Their Form and the Variability of the Radiographic Image: By Dean H. Hausrath, Northwestern University, Chicago, Illinois.

The purpose of this study was to investigate the relative variability of the craniometric landmarks located in the palatal and maxillary bones in the region of the bony palate. The problem was to determine the effect of skull rotation upon the relative positions of these landmarks as viewed on the lateral cephalometric radiograph, to determine the variation introduced by individual interpretation of these landmarks, and to compare the master tracings of the palatal-maxillary area of a sampling of skulls in order to observe the projected anatomic variation.

The landmarks in the skulls were delineated by radiopaque markers which permitted the formation of master tracings for each series of radiographs. Ear-rod attachments afforded accurate rotations of the skull studied. Ten observers traced in their interpretations of the craniometric points in the palatal-maxillary image as seen on five radiographs representing the skull in different positions.

It was observed that head rotation within the range of probability in the Broadbent-Bolton cephalometer had little effect on linear distances from nasion to the palatal-maxillary structures. Very small changes were created by rotation when angular measurements from the cranial base to the palatal-maxillary area were made.

Graphic illustration by scattergraphs and numerical illustration by standard deviations demonstrated the tracers' variability of interpretation of points located in the vicinity of the bony palate.

In depicting the contour of the nasal floor, the tracers showed the greatest inaccuracy when the skull was tilted to the right or left, rotating about the horizontal axis formed by the median sagittal plane and the Frankfort horizontal plane.

Considerable observer error was noted in tracing the line representing the median palatine suture area of the oral surface of the bony palate.

Certain observations were made by superimposing the master tracings over the unmarked radiographs taken of each skull.

58 Ellenwood Ave.
Los Gatos, Calif.

A Radiographic Cephalometric Study of Certain Occlusal Mandibular Movements in Individuals Possessing Malocclusion of the Teeth (Class I, Angle): By Arthur G. Hartwick, Northwestern University, Chicago, Illinois.

The purpose of this investigation was to study the approximate condylar, molar, and incisal paths from occlusion to incision to protrusion in persons

with Class I malocclusions (Angle) of the teeth but with apparent normal function of the temporomandibular joints (as evidenced by lack of objective or subjective symptoms of abnormal function) and, further, to compare the results obtained with a group of previously evaluated normals (Dierkes, 1957).

Seventeen subjects were selected, ranging in age from 10 years to 15 years 10 months (mean age = 12.49 years).

The data were obtained by using a functional cephalometric technique. Lateral cephalometric radiographs were obtained of the occlusion, incision, protrusion, and open-mouth positions, and composite master tracings of the first three of these positions were made and measured by means of a mandibular template constructed from the open-mouth and/or protrusive radiograph.

The results were analyzed statistically and graphically and compared with the normal sample by means of the "t" ratio.

The following observations were noted:

1. No significant correlation was found between the inclinations of the condylar and incisal paths or between the condylar and molar paths from occlusion to incision. The group studied showed greater variation of the three paths than was seen in the normal sample.

2. Severity of overbite was accompanied by a strong tendency for increased downward rotation from occlusion to incision and a lesser tendency for the incisal path to be steeper than the condylar path.

3. A strong tendency was found for the incisal path to be steeper where the maxillary incisors were more upright and, to a lesser degree, where the maxillary incisors were less protrusive and the mandible less retrusive.

4. The length of the condylar, molar, and incisal paths from occlusion to incision was found to be dependent upon the amount of overbite and overjet, and since overbite and overjet were greater in the malocclusion group, the paths were longer.

5. From incision to protrusion the condylar, molar, and incisal paths showed more variability, with the incisal and molar paths tending to be flatter in the group studied than in the normal sample. The condylar path was found to be generally steeper than the molar path which, in turn, was steeper than the incisal path, concurring with the findings in the normal sample. As a result of the greater overbite and overjet generally present, these paths were usually shorter than those from occlusion to incision. These results were at variance with the normal group in which overbite and overjet were negligible. No significant difference was seen between the total path lengths of the two groups compared.

6. Despite the great variability in the paths shown statistically, a general similarity was seen, although not as marked as that observed in the normal sample.

58 Wyckoff Ave.
Wyckoff, N. J.

News and Notes

American Association of Orthodontists

The fifty-sixth annual session of the American Association of Orthodontists will be held April 24 to 28, 1960, at the Shoreham Hotel in Washington, D. C.

The motif of the meeting will be international. There is no better setting for an ''international meeting of minds'' than our nation's capital. Washington is truly one

Cherry trees blooming along Tidal Basin in Washington, D. C., where the A.A.O. will meet April 24 to 28, 1960. The Washington Monument is in background at right.

of the most beautiful cities in the world. Little did the young Frenchman, Pierre Charles L'Enfant, realize that his pencil sketches of the projected capital of a young nation would someday achieve a reality beyond his fondest hopes and dreams to become the ''mecca'' for world leaders in every field.

Five of nine essayists are eminent orthodontists from Australia, Europe, and South America. You won't want to miss the lectures by C. P. Adams of Belfast, Ireland; P.

Raymond Begg of Adelaide, Australia; Newton de Castro of Rio de Janeiro, Brazil; Anders Lundstrom of Stockholm, Sweden; and Kaare Reitan of Oslo, Norway. These leaders of the orthodontic profession from abroad will be joined by Oren Oliver and Charles Tweed, both of whom will present essays. The first annual Mershon Lecture will be given by C. Edward Martinek. This has been made possible by a trust fund, in honor of Dr. Mershon, created for the A.A.O. by the late Mrs. Mershon. Robert Ricketts will present a condensed version of his A.B.O. thesis. The limited-attendance clinics and the general clinics will provide an opportunity to spend more time with these men, as well as with other outstanding orthodontists from here and abroad. An interesting round-table luncheon is being arranged.

Hotel facilities are unusually fine. Because of the expected large attendance, arrangements have been made with the Sheraton-Park Hotel, just one block away, for those who may not be able to obtain reservations at the Shoreham. Reservation cards will be mailed to you for your convenience this month. In keeping with the importance of this meeting, and in order to permit you to gain the most possible from each contribution, it is hoped that arrangements can be completed for closed-circuit television to augment the usual channels of communication.

For a profitable, educational, and pleasant social experience, make your plans now to attend the 1960 meeting!

George M. Anderson, *President*
T. H. Graber, *General Chairman*
B. Edwin Erikson, *Vice-Chairman*
Paul V. Reid, *Program Chairman*
Paul Hoffman, *Local Arrangements Chairman*
Stephen C. Hopkins, Sr., *International Relations*

American Board of Orthodontics

The next meeting of the American Board of Orthodontics will be held at the Shoreham Hotel in Washington, D. C., Monday, April 18, through Saturday, April 23, 1960. Orthodontists who desire to be certified by the Board may obtain application blanks from the Secretary, Dr. Wendell L. Wylie, University of California School of Dentistry, The Medical Center, San Francisco 22, California.

Applications for acceptance at the Washington, D. C., meeting, leading to stipulation of examination requirements for the following year, must be filed before March 1, 1960. To be eligible, an applicant must have been an *active* member of the American Association of Orthodontists for at least two years.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held at the Hotel Statler in Hartford, Connecticut, on Monday and Tuesday, Oct. 26 and 27, 1959.

Pacific Coast Society of Orthodontists*

The Northern Component meets on the second Tuesday of March, June, September, and December.

The Central Component meets on the second Tuesday of March, June, September, and December.

The Southern Component meets on the second Friday of March, June, September, and December.

*Excerpts from the *Bulletin* of the Pacific Coast Society of Orthodontists, July, 1959.

1960 MEETING OF THE PACIFIC COAST SOCIETY OF ORTHODONTISTS

Headliner for the 1960 meeting of the Pacific Coast Society, Palo Alto, will be Dr. Samuel Pruzansky. The meeting will be held February 21 to 24 in Palo Alto, California.

In addition to Dr. Pruzansky, Program Chairman Eugene E. West has announced that Dr. Carl Ellertson, pedodontist from Palo Alto and a diplomate of the American Board of Pedodontics, will present a paper dealing with observations made by pedodontists and their patients of the orthodontist and his practice.

CENTRAL COMPONENT

The second quarterly meeting of the Central Component of the Pacific Coast Society of Orthodontists was held at the Fraternity Club in San Francisco on Tuesday, June 9, 1959.

At the first session, President Walter Straub turned the meeting over to Program Chairman John Parker who introduced the clinicians, Dr. John S. Rathbone, able orthodontist from Santa Barbara, and John C. Snidecor, Ph.D., Professor of Speech at the University of California, Santa Barbara. Dr. Snidecor discussed the general factors of speech and described the various dental sounds. Dr. Rathbone related speech defects to dental anomalies. Both presentations were well received by a large attendance.

HAWAII SOCIETY OF ORTHODONTISTS

A special meeting of the Hawaii Society of Orthodontists was held at the Blackfield Enterprise Building on Monday, April 6, 1959.

President Robert Sample called the meeting to order at 8:30 A.M. The Chairman of the Day, Oliver Choy, then introduced Dr. Cecil C. Steiner of Beverly Hills, California, as guest speaker. Dr. Steiner's subject was "Cephalometrics and Its Application to Clinical Practice and Treatment Philosophy."

SOUTHERN COMPONENT

The regular quarterly meeting of the Southern Component was called to order by Chairman Howard Lang on Friday, June 12, 1959, at the Hotel Statler in Los Angeles.

Dr. Robert Ricketts presented Dr. Pruzansky, who gave an address on "Postural Positions and Movements of the Mandible and Contiguous Structures." Dr. Pruzansky pointed out the necessity for considering the sensory input and muscular output, reminding us how the receptor cells feed information into the central nervous system. He referred to the complex synergism of related groups of muscles with which the orthodontist must deal in treatment and retention.

John Hopkins announced and read the new fee schedule for cases coming under the program for the physically handicapped. It is to be noted that "fee schedule" and "table of allowances" are not accurately interchangeable terms. "Table of allowances" refers to a partial or complete payment of a fee, but with any difference being made up by the patient. This would operate in such cases as union welfare or insurance funds. The "fee schedule" is a set, unchangeable fee and is in operation in such cases as those handled by the physically handicapped programs. It would, of course, be desirable to promote and secure acceptance of the table of allowances by any program.

The Education Committee, with Herb Muchnic as chairman, met with Dean McNulty to express their concern with the failure to re-establish an orthodontic postgraduate course at the University of Southern California. Dean McNulty is aware of this problem and continues to interview candidates for the head of the orthodontic department.

Herb Muchnic, who is a member of the Budget Committee of the A.A.O., had the happy duty and privilege of announcing the nomination of our own Dallas McCauley to the Presidency of the A.A.O. for the year 1962, at which time the meeting will be held in Los Angeles. Dallas has accepted the challenge, and with a few very appropriate remarks he outlined the requirements to provide an excellent meeting.

The Necrology Committee chairman, Cal Garverick, announced the passing of Drs. Singleton, Jack Taylor, and George Lee Turner. The members present paid their simple respects for the departed brethren.

Fred McIntosh presented to Burton Fletcher a plaque which appropriately commends his fine work as a component chairman for the year 1958.

Prospects for a Las Vegas meeting in November were enthusiastically received.

NORTHERN COMPONENT

The June 28-29 meeting of the Northern Component was held at the Davenport Hotel in Spokane. The hotel advised us that individual reservations should be made as early as possible.

Program Chairman Denny Rees provided an impressive schedule of events. Howard Lang of Los Angeles headlined the activities for the two days. The following papers were presented:

Treatment Philosophy and Review of Cases Ten Years After Treatment. Dr. Howard Lang, Los Angeles, California.

Group Orthodontic Practice. Dr. E. F. Butori, Portland, Oregon.

Anterior Tooth Discrepancies. Dr. Wayne Bolton, Seattle, Washington.

At the American Association of Orthodontists meeting in Detroit, Al Moore was made a member of the American Board of Orthodontists. Other local members attending the meeting were Drs. Dick Riedel, Pete Bishop, and Bertram Krause, nationally known physical anthropologist and member of the Department of Orthodontics at the University of Washington.

Rocky Mountain Society of Orthodontists

The thirty-ninth annual fall meeting of the Rocky Mountain Society of Orthodontists was held Sept. 13 to 16, 1959, at Aspen Meadows in Aspen, Colorado. The program was as follows:

A Discussion of the Usefulness of Cephalometry to Everyday Clinical Practice. Cecil C. Steiner, Beverly Hills, California.

Rationale of Orthodontic Treatment. William L. Wilson, Boston, Massachusetts.

Treatment Planning in the Light of Orthodontic Objectives and the Application of Appliance Considerations. William L. Wilson, Boston, Massachusetts.

Mountain Climbing in the Himalayas. Charles Houston, Aspen, Colorado.

Timing Treatment in Class II, Division 1 Malocclusions. Elbert W. King, Albuquerque, New Mexico.

Southwestern Society of Orthodontists

Under the direction of Dr. Marcus D. Murphey, president, the Southwestern Society of Orthodontists held its thirty-ninth annual meeting at the Shamrock-Hilton Hotel in Houston, Texas, Oct. 4 to 7, 1959.

Dr. E. Forris Woodring of Tulsa, Oklahoma, was presented with the Martin Dewey Memorial Award.

The scientific program was as follows:

Robert M. Ricketts, D.D.S., M.S., Pacific Palisades, California:

Clinical Cephalometrics

I. Review of Last Year's Lectures—Radiographic Interpretation and Diagnosis.

II. Normal Growth and Growth in Class II Cases nontreated.

Morris M. Stoner, D.D.S., Indianapolis, Indiana:

Force Control and Clinical Practice

I. An Analysis of Orthodontic Force, Introducing Some New Variations of Arch Wire Design.

II. The Application of Principles of Force Control to Obtain Efficiency in Treatment.

III. Technique of Construction of the Appliance.

IV. Demonstration of Treated Cases.

Harold Born:

Aids in Case Presentation.

Panel Discussion: Summary of the Application of Contemporary Ideas in Diagnosis and Treatment.

Robert M. Ricketts and Morris M. Stoner.

The formal presentation was followed by a long series of general clinics.

American Dental Association*

JUSTICE DEPARTMENT DENIES DROPPING ANTITRUST PROBE OF DENTAL SOCIETIES

The August, 1959, issue of *Dental Laboratory Review* contains an erroneous report stating that the Justice Department has withdrawn from the investigation of relations between some state dental societies and dental laboratories approved by the societies. The item on page 18 further says the antitrust investigation has been turned over to the Federal Trade Commission. A query to the Justice Department Antitrust Division by the Association's Council on Dental Trade and Laboratory Relations brought a reply that the *Dental Laboratory Review* report is inaccurate. A source at Justice said the investigation of A.D.A. and a few state societies is still active.

CONGRESS APPROVES $10,019,000 FOR DENTAL HEALTH AND RESEARCH ACTIVITIES

The Health, Education and Welfare appropriations bill for fiscal 1960—which includes $10,019,000 for federal dental health activities under auspices of the National Institute of Dental Research—was awaiting presidential action as this issue of *A.D.A. News Letter* went to press. Congress had approved a bill with this figure, which was agreed to by conferees assigned to reconcile differences between House and Senate versions of the legislation. The House had called for $9,725,000, while the Senate raised the figure to $10,164,000. Final figure of $10,019,000—which is $2,599,000 more than the administration's proposed budget for these activities—is in substantial accord with Association recommendations.

A.D.A. RECOMMENDS FEDERAL ACTION ON PROBLEMS OF AGED IN THREE AREAS

Dr. Rudolph H. Friedrich, secretary of the Association's Council on Dental Health, has told the Senate Subcommittee on Problems of the Aged and Aging that much needs to be done to make dental care available to elderly persons who are institutionalized or homebound. Testifying before the group on August 6, Dr. Friedrich said these two groups constitute a "critical problem." It must be recognized, he noted, that many aged persons will not cooperate and some actually refuse needed dental care. Dr. Friedrich presented the following Association recommendations for action in three areas where the federal government has "existing, effective means for cooperating in the improvement of the dental health of elderly citizens":

1. Additional federal support for dental research projects. This would increase federal grants administered by the National Institute of Dental Research now supporting 40 research projects relating to oral health problems of the aged.

*From the *A.D.A. News Letter,* Aug. 14, 1959.

2. Establishment of a federal grants-in-aid fund under the U. S. Public Health Service Act for support of state dental public health activities.
3. Encouragement of state legislatures and administrative agencies to allocate funds from public assistance grants for dental care.

Disability Income Insurance Plan

The time limit for enrollment in the American Association of Orthodontists' disability income insurance plan has been extended by the insurance company in order that those who failed to apply before October 1 may still make application. Those wishing to apply are urged to write or wire the administrators, Treloar and Heisel, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

A. A. O. Insurance Committee.

Dr. Krogman Made Honorary Member of A. A. O.

Wilton M. Krogman, Ph.D., LL.D., Professor of Physical Anthropology, Graduate School of Medicine, University of Pennsylvania, and Director, Philadelphia Center for Research in Child Growth, was made an honorary member of the American Association of Orthodontists at the annual meeting held in Detroit in May, 1959.

Dr. Krogman has contributed much to the program of various orthodontic societies throughout America during the past decade.

Death of Leigh C. Fairbank, Jr.

With deep regret, we report the sudden death of Colonel Leigh C. Fairbank, Jr., of Houston, Texas, at the age of 44. Colonel Fairbank was the son of Lieutenant Colonel Leigh Fairbank (Ret.), who pioneered orthodontics in the United States Army.

Notes of Interest

Dr. Kennith J. Alley has disposed of his office and orthodontic practice in Des Moines, Iowa, and announces the opening of a new office at 511 W. Walnut St., Roswell, New Mexico, practice limited to orthodontics.

Dr. K. T. Andrews announces the opening of his office at Westside Medical Bldg., 1160 Chili Ave., Rochester, New York, practice limited to orthodontics.

Dr. George L. Englert announces the removal of his office to 307 W. University, Champaign, Illinois, practice limited to orthodontics.

Dr. Ernest T. Klein has moved his office to 707 Republic Bldg., Denver, Colorado, practice limited to orthodontics.

Abraham Lees, D.D.S., announces the association of his son, Richard Ira Lees, D.D.S., in the exclusive practice of orthodontics at 745 Fifth Ave., New York, New York.

J. E. Rook, D.D.S., announces the removal of his University City office to 306 Midwood Bldg., 2600 Woodson Rd., Overland, Missouri, practice limited to orthodontics.

Edward Wolf, D.D.S., M.S.D., announces the opening of his office for the limited practice of orthodontics in the Bel-Park Medical Center, 1005 Belmont Ave., Youngstown, Ohio.

Forthcoming meetings of the American Association of Orthodontists:
1960—Shoreham Hotel, Washington, D. C., April 24 to 28.
1961—Denver, Colorado.
1962—Los Angeles, California.
1963—American Hotel, Miami Beach, Florida.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and its component societies. The Editorial Board of the JOURNAL is composed of a representative of each of the component societies.

American Association of Orthodontists
(Next meeting April 24-28, 1960, Washington)

President, George M. Anderson - - - - - - - - - - - - - 3700 N. Charles St., Baltimore Md.
President-Elect, William R. Humphrey - - - - - - - - - - - Republic Bldg., Denver, Colo.
Vice-President, Frank A. Heimlich - - - - - - - - - 1824 State St., Santa Barbara, Calif.
Secretary, Earl E. Shepard - - - - - - - - - - - - - 8230 Forsyth, St. Louis, Mo.

Central Section of the American Association of Orthodontists

President, John R. Thompson - - - - - - - - - - 55 E. Washington St., Chicago, Ill.
Secretary-Treasurer, William F. Ford - - - - - - - 575 Lincoln Ave., Winnetka, Ill.
Director, Elmer F. Bay - - - - - - - - - - - - 216 Medical Arts Bldg., Omaha, Neb.

Great Lakes Society of Orthodontists
(Next meeting Nov. 29-Dec. 2, 1959, Cleveland)

President, Richard C. Beatty - - - - - - - - - - - 1140 Hanna Bldg., Cleveland, Ohio
Secretary, D. C. Miller - - - - - - - - - - - - - 40 South Third St., Columbus, Ohio
Director, Harlow L. Shehan - - - - - - - 601 Jackson City Bank Bldg., Jackson, Mich.

Middle Atlantic Society of Orthodontists

President, Stephen C. Hopkins, Sr. - - - - - 1746 K St., N. W., Washington, D. C.
Secretary-Treasurer, Charles S. Jonas - - - - - - Mayfair Apts., Atlantic City, N. J.
Director, B. Edwin Erikson - - - - 3726 Connecticut Ave., N. W., Washington, D. C.

Northeastern Society of Orthodontists
(Next meeting Oct. 26 and 27, 1959, Hartford, Conn.)

President, Wilbur J. Prezzano - - - - - - - - Medical Centre, White Plains, N. Y.
Secretary-Treasurer, David Mossberg - - - - - - 36 Central Park S., New York, N. Y.
Director, Norman L. Hillyer - - - - - - - 230 Hilton Ave., Hempstead, L. I., N. Y.

Pacific Coast Society of Orthodontists
(Next meeting Feb. 21-24, 1960, Palo Alto)

President, Richard Railsback - - - - - - - - - - 1333 Grand Ave., Piedmont, Calif.
Secretary-Treasurer, Warren Kitchen - - - - - - 2037 Irving St., San Francisco, Calif.
Director, Richard Railsback - - - - - - - - - - - 1333 Grand Ave., Piedmont, Calif.

Rocky Mountain Society of Orthodontists

President, Howard L. Wilson - - - - - - - - - - 1107 Republic Bldg., Denver, Colo.
Secretary-Treasurer, E. H. Mullinax - - 209 Lakewood Medical Center, Lakewood, Colo.
Director, Ernest T. Klein - - - - - - - - - - - - 707 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists
(Next meeting Oct. 11-14, 1959, Atlanta)

President, H. Harvey Payne - - - - - - - - - - - 60 Fifth St., N.E., Atlanta, Ga.
Secretary-Treasurer, William H. Oliver - - - - - - 1915 Broadway, Nashville, Tenn.
Director, Boyd W. Tarpley - - - - - - - 2118 Fourteenth Ave., S., Birmingham, Ala.

Southwestern Society of Orthodontists

President, Marcus Murphey - - - - - - - - - - - 2017 West Gray, Houston, Texas
Secretary-Treasurer, Harold S. Born - - - - - - 908 S. Johnstone, Bartlesville, Okla.
Director, Nathan Gaston - - - - - - - - - - - - - - 701 Walnut St., Monroe, La.

American Board of Orthodontics
(Next meeting April 18-23, 1960, Washington)

President, L. Bodine Higley - - - - University of North Carolina, Chapel Hill, N. C.
Vice-President, Jacob A. Salzmann - - - - - - - 654 Madison Ave., New York, N. Y.
Secretary, Wendell L. Wylie - - - - - - University of California School of Dentistry,
The Medical Center, San Francisco, Calif.
Treasurer, Paul V. Reid - - - - - - - - - 1501 Medical Arts Bldg., Philadelphia, Pa.
Director, B. F. Dewel - - - - - - - - - - - - - - - 708 Church St., Evanston, Ill.
Director, Frank P. Bowyer - - - - - - - - - 608 Medical Arts Bldg., Knoxville, Tenn.
Director, Alton W. Moore - University of Washington School of Dentistry, Seattle, Wash.

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e book is found in the collections.

- The Margolis Cephalostat, the X-ray Fixator and the Camera Mount are now being constructed and distributed by the College of Engineering in conjunction with the Cleft Palate Institute of the School of Dental Medicine of Tufts University.

- All Communications to be addressed to: Mrs. Kathleen Barth, Executive Secretary, Cleft Palate Institute, Tufts University, School of Dental Medicine, 37 Bennet Street, Boston, Mass.

- It should be emphasized that the construction and distribution of this equipment is strictly on a non-profit level on the part of Tufts University and those individuals associated with the University.

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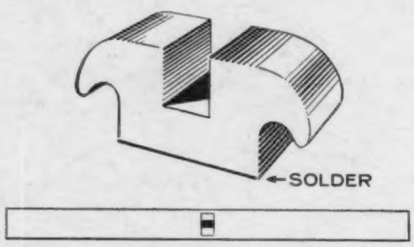
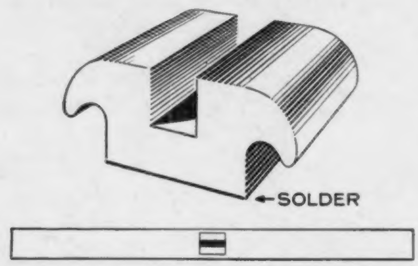


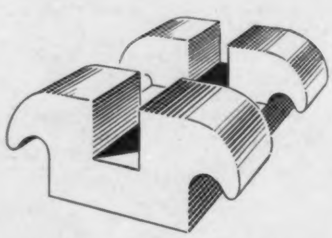
Posterior .100″ wide M 452AS



Pre-soldered Metalba* Edgewise Brackets are strong; remain clean in the mouth; can be soldered to; can be used on precious metal or Stainless Steel bands; and, used over and over again.

Divided Triple-width Edgewise Brackets

M 455



A convenient bracket for rotations as it provides two anchor points for ligatures. Supplied without solder to permit slight bending if required.

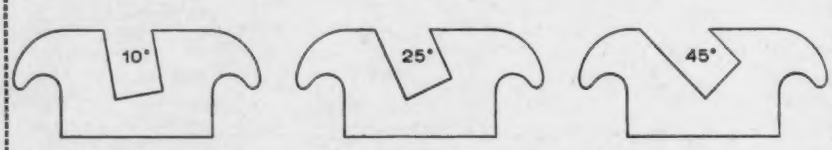
Anchor Tubes

M 474

Metalba* Anchor Tubes for use in connection with Torque Slot Edgewise Brackets. They are ¼ inch long, rectangular tubes, with a bore of .022 x .028. The side of the tube which is to be soldered to the band has a 10 degree angle to permit it to fit into the Torque Slot Bracket assembly.

*METALBA—platinum color, precious metal.

Torque slot, Divided Triple-width Edgewise Brackets



The angle of the wire slot in the Bracket gives direction to the Torque force of arch wire.

M 516	Torque 10°	Width	.140 inches
M 517	Torque 10°	Width	.180 inches
M 518	Torque 25°	Width	.180 inches
M 519	Torque 45°	Width	.180 inches

METALBA

S.S.WHITE

THE S. S. WHITE DENTAL MANUFACTURING CO.

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